PROCEEDINGS

1986 MANITOBA BEEF CATTLE SEMINAR JANUARY 21 - 22

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1986 MANITOBA BEEF CATTLE SEMINAR
January 20-22, 1986
Agricultural Extension Centre
Brandon, Manitoba

To mark the start of the second decade of Beef Seminars we have assembled a top-notch group of speakers with practical suggestions useful to producers in the cattle business. This is also the second year the Manitoba Beef Cattle Performance Association joins Manitoba and Canada Agriculture as co-sponsor. A special feature for '86 is the addition of several computers and some beef cattle programs for you to try.

MONDAY EVENING, JANUARY 20

7:00 - 9:30 Registration — Agricultural Extension Centre

TUESDAY, JANUARY 21

Morning chairman — *Dr. Bernie Sonntag*, Director Ag Research Station, Brandon
7:30 Breakfast — Agricultural Extension Centre, Brandon
8:30 Registration and visit commercial displays and the computer room.
10:00 **Economics and Beef Cattle Selection** — *Dr. Victor Jacobs, University of Missouri*
11:30 Discussion and questions
NOON Lunch — Agricultural Extension Centre
Afternoon Chairman — *Dr. Gunther Rahnefeld*, Ag Research Station, Brandon
1:00 **Making Beef Production an Enterprise** — *Steve Radakovich, Earlham, Iowa*
2:30 Coffee and discussion
3:00 **Economic Efficiency in Beef Production** — *Dr. Victor Jacobs*
4:00 Discussion and questions. Visit displays and the computer room.
6:00 Supper — Agricultural Extension Centre
7:00 Evening Program Chairman — *Dr. Frank Baker*, Director Animal Industry Branch Manitoba Agriculture
Premier Breeder Awards
8:00 **"Beef it Up!"** — a look at new product development
Karen Skaykewich - Human Ecology, U. of Manitoba
9:30 Bull Session — Recreation Room

WEDNESDAY, JANUARY 22

Morning Chairman — *Earl Geddes*, Manitoba Beef Cattle Performance Assoc.
7:30 Breakfast — Agricultural Extension Centre
8:30 **Management of Young Bulls** — *Paul Redd, Paradox, Colorado*
10:00 **New Developments in Fencing** — *Brian English, Ag Engineer Manitoba Agriculture, Arborg*
11:00 **Custom Feeding in Manitoba** — *Richard Hamilton, Ochre River*
11:45 Discussion and Questions
NOON Lunch — Agricultural Extension Centre — and visit the computer room
Afternoon Chairman — *Norm Hemstad*, Manitoba Agriculture
1:30 **Record of Performance — What it means to my operation**
PANEL — *Roger Mawer, Alexander; George Boucher, Binscarth; Ron Batho, Oak Lake*
3:00 Discussion and Questions
3:30 Adjourn

The "Computer Room" adjacent to the Ag Centre auditorium will have computerized budgets on cow-calf, feed lot enterprises, a "growing on grass" budget and other items. Bring your own figures to test the pros and cons the "what ifs" and take home a personalized print out for study at home.

SEMINAR SPEAKERS

Dr. Victor Jacobs — Extension Economist at the University of Missouri, Dr. Jacobs is widely respected for his views on how to make the beef business pay.

Steve Radakovich — Steve is co-owner of the Radakovich Cattle Company. With 300 registered Herefords, Polled Herefords and Angus cows, they are innovators in the breeding, selection and culling in central Iowa.

Karen Skaykewich - Karen is a professor in the Foods and Nutrition section of the University of Manitoba's Faculty of Human Ecology.

Paul Redd — Considered a real authority on the selection of young bulls.

Brian English — Ag Engineer with Manitoba Agriculture. Brian has tried out a number of different fencing methods and new equipment.

Richard Hamilton — An Ochre River feedlot operator, Richard will talk about some things that have worked —and some that haven't.

Roger Mawer — Manages the Limousin and Blond Aquitaine bull test station on his Alexander area farm.

George Boucher — Binscarth area producer who raises Simmental cattle on his farm. Won the Premier Breeder (Commercial) Award in 1985.

Ron Batho — raises purebred Herefords at Oak Lake. Winner of Premier Breeder Award (Purebred) in 1985.

ECONOMICS AND BEEF CATTLE SELECTION: HAVE WE REALLY DISCOVERED THE "PROMISED LAND"?

by
V. E. Jacobs*

Are we really selecting beef cattle with real economic superiority--or only making different mistakes than in prior decades? The urgency of that question is much heightened by the sophisticated technologies now at our disposal for multiplying our successes--or our mistakes! AI (Artificial Insemination), combined with dilution and freezing techniques, make it possible to produce most of the nation's beef cattle (especially breeding stock) from a relatively small number of sires believed to be superior. Widespread use of these Super Bulls in many herds, combined with sophisticated statistical techniques and the "number crunching" capabilities of computers have given us sire summaries with accurate EPD's (Expected Progeny Differences) for the traits being measured. Non-surgical ET (Embryo Transfer), along with chemically induced multiple ovulation and estrus synchronization, have made it possible to produce huge "litters" of calves each year from cows believed to be outstanding in economic merit. Increasing success in freezing embryos will make ET still more successful and more economic, as the problem of matching up synchronized recipient cow numbers with an unpredictable number of recoverable embryos is minimized. "Mail-Order Calves" are now technically feasible.

Now, where does this veritable wonderland of bio-technology leave us? It much shortens the long generation interval of beef cattle and vastly accelerates the speed with which we can multiply our successes--or our mistakes!

Criteria for Selecting Our Selection Criteria

If our genetic progress is to live up to our hopes and needs, our selection criteria must meet three tests:

- oo Heritable Traits. The trait must be heritable if selection is to have any effect.
- oo Observable Traits. If we can't measure it, we can't select for it.
- oo Economic Significance. So long as beef production is pursued for economic gain, the trait should have real "bottom-line" economic significance.

It is with the last two criteria that this paper is primarily concerned.

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The "Per Head Hang-Up": Ease of Measurement vs. Economic Import

Obviously it is much easier to weigh an animal than to measure its feed efficiency. It is immeasurably easier than to directly measure the comparative bottom-line economic return to the cattleman from alternative animals and/or types of animals. Thus, ease of measurement tends to dominate the selection. This, then, leaves wide open the question of just how well do our selection criteria really identify and measure the real economic merit of beef animals?

In short, what do yearling weights, weaning weights, ADGs, frame scores, etc., really tell us about the economic merit of beef animals? These easily measured "per head" traits have commonly been assumed to be closely correlated with energetic and economic efficiency. Under what conditions are they--or aren't they?

Some sorting out and "unraveling" will be required. The relationships between economic (or even energetic) efficiency and these per head traits have often been seriously confounded by naive comparisons and careless logic.

oo The Naive Comparison. A decade or so ago, several postweaning gain and efficiency tests were made of cattle (or breeds) of quite diverse genetic sizes. Animals (or types or sizes) were compared for feedlot gains and feed efficiencies to a constant market weight (say 1,000 lb.) or over a constant time on feed (i.e., 140 days). In such comparisons, some animals were over-finished while others were slaughtered at much less than market finish. In effect, the comparisons were really of animals fed to differing degrees of fatness and physiological maturity. When the test was terminated at a target market weight (i.e., 1,000 lb.), the calf from the 800 pound mother was quite mature and over-finished--while the calf from the 1,600 pound dam was still immature, young, growing, and under-finished. The results were predictable before such tests were conducted.

oo The "Terminal Point" Issue. Postweaning feed efficiency comparisons at the US Meat Animal Research Center (MARC) at Clay Center, Nebraska, demonstrate the importance of the "terminal point" employed in such feedlot comparisons. In Table 1, steers sired by two British breeds (Angus and Hereford) are compared with steers sired by bulls of the four largest continental breeds in the test (Chianina, Maine-Anjou, Charolais, and Simmental) when the steers were fed to four alternative endpoints (constant weight of 1,036 pounds, constant feeding period of 238 days, constant grade of USDA choice, and constant 18.9 percent fat trim).

As can be seen in Table 1, the feed efficiencies are about as should be expected to either a constant weight or over a constant feeding period. The genetically larger and later maturing breeds were physiologically younger and less fat--hence more efficient up to either of those two end points. When each cross, however, was fed to either a constant market grade or to a constant degree of fatness, the

advantage shifts to the genetically smaller breeding groups. This was perhaps less predictable.

While most cattle in the U.S. are fed to reach market grade (based on marbling)--subject to avoidance of wastiness--the constant fat trim termination point was perhaps employed because fat thickness was suggested a few years back as a substitute for marbling in the grading system.

TABLE 1. Comparative feed efficiencies of two genetic sizes when fed to four alternative end-points[1]

	Feed energy (in M cal ME) per pound of gain when fed to four end points			
Breed Groups	1,036 Lbs.	238 Days	USDA Ch.	18.9% Fat Trim
Sired British Bulls	10.67	10.49	10.54	10.07
Sired by four largest continental breeds	9.66	10.25	11.32	12.05
Advantage continental--sired	-1.01	-0.24		
Advantage British-sired			-0.78	-1.98

[1]U.S. MARC, Clay Center, Nebraska

oo Carcass Size: A Separate Issue. While genetically smaller cattle may be just as efficient (or even more efficient) when fed to their appropriate market finish, they (as will any cattle) show a decided disadvantage in feed efficiency when fed beyond their appropriate market weight and finish. It is not that they are inherently less efficient in use of feed--rather that they may finish before they reach a preferred carcass or live weight. Most packers seem to prefer a carcass weight in the 600-800 pound range (live weights of perhaps 1000-1300 lb.)--and--weights outside these ranges (on either end) may suffer a substantial price penalty.

Thus, genetic size does have economic importance--totally apart from any relationship it has to feed efficiency. In short, they must "fit the box"--or the demands the "box" is sized to fit.

But, "ever more" is not "ever better"! "Too big" also can cause problems, and the show-ring quest for the biggest in the land must ultimately lead to economic irrelevancy! The target should be "optimum"--not "maximum."

oo Rate of gain and feed efficiency: Kissin' Cousins--or not even shirt-tail relatives? If there was any fundamental underlying assumption on which beef performance testing was based, it

was that faster gaining animals are more efficient users of feed. Easily observed differences in rate of gain were assumed to be reasonable "proxies" (or indicators) of more difficultly-measured differences in individual feed efficiencies. How valid was (and is) that assumption? The answer would seem to depend on how the question is stated. When cattle of the same initial weight and age are compared, rate of gain correlates rather well with feed efficiency. This was predominately the case in much early research with cattle of similar genetic mature sizes.

On the other hand, when cattle of quite different mature sizes and frame scores (hence with differing initial or on-feed weights) are compared, rates of gain may be very poorly related to feed efficiencies. For instance, in the pioneering frame size research that was conducted at the Wisconsin station in the early 70s (Brungardt), there was essentially no relationship between feed efficiencies and average daily gains among the different frame scores. The larger-framed cattle did gain faster, but they also had larger initial weights and their superior gains were not associated with superior feed efficiencies.

Thus, it would seem reasonable to conclude that faster gains are more efficient when initial weights are the same or similar. In comparisons among cattle of diverse mature sizes and frame scores, the faster gains of genetically larger animals may carry no efficiency advantages. They may only be required just to offset or counter larger maintenance requirements of the larger-at-all-ages larger cattle. Today's wide diversity in mature size and frame casts a dark cloud of ambiguity over the presumed usefulness of rate of gain as a "sure" proxy for feed efficiency. The usefulness of weaning and yearling weights as efficiency indicators falls under the same cloud of ambiguity, despite the popularity and general acceptance by the industry of such measures.

oo Absolute vs. Relative Rate of Gain. When wide diversity in genetic size exists, absolute rates of gain are less useful than relative rates of gain as proxies for efficiency. In the Wisconsin frame-size experiment, feed efficiencies were much more closely related to measures of "relative" gain than to absolute or raw ADG (average daily gain). Percentage increase in weight (ADG ÷ Wt.) or gain per unit of metabolic weight (ADG ÷ $W^{0.75}$) were far better indicators of efficiency than ADG. Once adequate carcass size is achieved, more adequate indicators of energetic efficiency would seem essential in selection programs. Such simple per head traits as weaning and yearling weights, ADGs, etc., are simply not good indicators of feed efficiency when comparisons are made among diverse genetic sizes and frame scores.

oo Maturity Rates and Genetic Size. After a few years of performance testing, concern gradually surfaced with respect to body composition and maturity rates. Some animals performed well by weight criteria, but were believed to be too fat on attaining an impressive yearling weight. Ultra-sonics and measures of radioactive potassium (as proxies for fat-free body mass) and other devices were employed to describe body composition (lean vs. fat) in performance tested bulls. Most recently, the "frame score" (based on wither or hip height) has

been employed--especially in the show-ring --to select for larger, later maturing animals. The most damning description, in some breeding circles, was the phrase "early maturing."

Here, a very important distinction must be made. Is (and was) the real problem one of too early attainment of mature size and frame? Or, was the problem one of maturing at too small a size--not one of getting there too soon? It will be contended that the latter is the correct one and that early maturity is a virtue--not sin. But, the animal must mature to a large enough size to meet carcass weight specs before getting too fat.

Why the ambiguity between maturing rate and genetic size? It has long been known that larger animals of all species take longer to mature on an average. In an absolutely remarkable book published four decades ago (Bioenergetics and Growth), Samuel Brody generalized the relationship among species as follows: $W = .000134\ t^{3.4}$; where "W" is the mature weight (in kg.) of the species and "t" is the time in months to attain 98 percent of mature weight. This equation can be transformed into one that relates time to maturity (t) to mature weight (W):

$$t = 13.775\ W^{0.294}.$$

Thus a species twice as large (1000 kg. vs. 500 kg.) would require 22.6 percent longer to attain its mature weight:

$$\frac{t_{1000}}{t_{500}} = \frac{13.77(1000)^{.294}}{13.77(500)^{.294}} = 1.226$$

Similar relationships tend to hold within species. Thus, the "too small" animal would, on an average, be earlier maturing than the larger one. But, and this is crucial, the problem is the "too small" --not the "early maturing". In fact, as we'll see, our objective should probably be--as early maturing as possible--but of adequate genetic mature size and frame to finish at desired carcass weights!!

An Analysis of 15 Sire Breed Crosses at U.S. MARC

At the U.S. Meat Animal Research Center in Clay Center, Nebraska, fifteen sire breed crosses were evaluated from conception to carcass in 5569 calvings. Twenty-one hundred steers from these crosses (all from Angus and Hereford dams) were fed out and slaughtered at the end of varied period lengths. Feed efficiencies were calculated for termination at constant weights, feeding periods, fat trims, and quality grades (as in Table 1).

Now, what measurable per head traits were best associated with differences in feed efficiencies when fed to constant market grade (USDA Choice)? Table 2 compares the feed efficiencies between the 5-High and the 5-Low breed crosses by each trait. Four size related traits are given first: mature weight of females; birth weight of the cross; 452 da. weight of the steers; and post-weaning daily gain of the

steers. Three maturity rate traits are then reported: 452 day weight divided by birth weight, age at puberty in the females, and gestation length.

As can be seen in Table 2, the largest differences in feed efficiency are associated with maturity rate, with the early maturing crosses consistently having the advantage. Differences are much smaller when crosses were sorted by size-related traits--and the relationships are much more ambiguous. Large birth weight crosses were less efficient, large differences in mature size essentially were associated with no difference in feed efficiency. Even 452-day weights of the steers were associated with only a 0.4 percent difference between largest and smallest one-thirds of the crosses. Only postweaning ADG--which could be affected as much by maturity rate as by genetic size--shows any difference comparable to the maturity rate measures. It may be surprising that shortness of gestation and earliness of sexual maturity were associated with the second and third largest differences.

Table 2. Differences in feedlot feed efficiency of high and low thirds of 15 breed crosses by size and maturity rate related traits (U.S. MARC, Clay Center, Nebraska)

	Percent Feed Efficiency Advantage or Disadvantage
I. SIZE RELATED TRAITS:	
Large mature weight (females, 6½ years)	0.2% advantage
Large birth weight	3.2% disadvantage
Large 452 da. weight (Steers)	0.4% advantage
Large post-weaning gain	4.4% advantage
II. MATURITY RATE TRAITS:	
Early puberty (in females)	5.2% advantage
Short gestation (of cross)	5.9% advantage
Large 452 da. weight ÷ Birth weight	6.0% advantage

Table 3 differs from Table 2 in that all fifteen crosses are analyzed rather than just the High and Low Third in each trait. It also contains an added size-related trait--hip height of the females at 6½ years.

Because of the dominance of frame scores (heights) in show-ring selection in recent years it is particularly interesting. In these correlations among height and efficiency rankings, an R value of -.32 indicates taller crosses were less--not more--efficient!

Table 3. Simple correlations between feed efficiency rankings (to USDA Choice) and rankings by selected traits among all 15 breed crosses (US MARC)

	R
SIZE TRAITS:	
Wt. females at 6½ yrs.	-.10
Birth wt. of the cross	-.20
425 da. wt. of steers	.19
ADG of steers (post-weaning)	.33
Hip ht. of females @ 6½ yrs.	-.32
MATURITY RATE TRAITS	
Earliness of puberty	.56
452 da. wt. ÷ B.W.	.60
Shortness of gestation	.67

Needed: Per Head Traits That DO Proxy for Energetic Efficiency

If the easily-measured per head traits (W.W., Y.W., ADG, etc.) are not good indicators of feed or energetic efficiency when compared across diverse sizes and types of beef cattle, are there easily-observed substitutes that are good proxies for efficiency? The above cited analyses of the fifteen breed crosses at MARC seem to suggest maturity rate. This is another way of suggesting "relative" gains. In short, fast gains RELATIVE TO either: (1) ultimate mature size; (2) birth weight [as an indicator of mature size]; or (3) metabolic weight [or some other proxy or indicator of maintenance energy requirement].

Re-analysis of the group means reported for the fifteen breed by frame size groups tested at the Wisconsin station (V. H. Brungardt) in the 1969-71 period indicates real promise for some sort of "relative" gain approach. While less than half a percent of the feed efficiency differences among these groups was explainable by differences in their absolute rates of gain (ADG), differences in their "relative" gainability were much more promising. When their ADG's were expressed as a percent of their average weights during the feedlot test, a much more solid 58 percent of the differences in feed efficiency were explained by this trait. A nutritionally sounder measure of their gain, relative to their maintenance requirement, might be expected to be their ADG divided by their average "metabolic" weight (or $W^{0.75}$). Indeed, when ADG ÷ $W^{0.75}$ is used, a more useful 70 percent of the variance in feed efficiency among groups is explained. (The 0.75 power of body weight was used because it is conventionally assumed that maintenance energy requirements are proportional to that power of body weight.)

While such a "relative" gain concept may improve the usefulness of feedlot test ADGs, it does not help with the "what-to-do about weaning or yearling weights" question. Somehow these also need to be related to mature size or birth weight (as its proxy)--or to cow size or to the cow's feed or maintenance requirement. Such an easy transformation or conversion is not at hand. Visual appraisal of body (or feed) capacity as an indicator of the potential for early maturation may help.

Cow efficiency may be more adequately measured by some ratio of weaning weight to some fractional power of the mother cow's weight. Weight weaned as a percent of the cow's weight clearly gives far too much selection advantage to the small cow. Weaning weight divided by the 0.75 power of the cow's weight probably still gives a bit too much advantage to small cows. Dinkel and others (South Dakota) did not find the 0.75 power of body weight to be particularly useful in predicting energetic efficiency.

Preliminary re-analysis of data published from cow size experiments leads this writer to suspect that energy requirements (and calf production) are probably associated with a smaller power of body weight. In cow size studies by Klosterman and Parker at Ohio State, with 133 individually fed cow-calf pairs, there was very little difference in energetic efficiency up to weaning among size groups. Reanalysis of their published data by this writer suggests that TDN requirements to weaning were best associated with the 0.5 power of cow weight. If such a relationship proves representative, then a much more adequate indicator of cow efficiency would be the ratio of the calf's weaning weight to the 0.5 power of the cow's weight. Thus: $\text{Eff.} = WW/CW^{.50}$.

More research (and re-analysis of old research) is needed to specify just what fractional power best describes the relationship between feed requirement and cow weight. Nevertheless, absolute weights (i.e., WW) must be related to some indicator of the cow's feed requirement if they are going to continue to be especially useful in selection. Differing milk production potentials will seriously confound such efforts, but the urgency of the need appears to demand some bold attempts at an improved--and easily observed (or calculated) indicator of cow efficiency.

Energetic Efficiency vs. Economic Efficiency

This paper has been concerned primarily with feed (or energetic) efficiency. How reliable a proxy is it for bottom line economic efficiency? It should be a very useful indicator of profitability and economic efficiency if:

(1) Other costs tend to be proportional to feed costs;

(2) Costs per unit of feed or energy are not different among cattle types and sizes:

(3) Selling prices for physical pounds produced are the same among all animals; and

(4) Calving and weaning percentages and other death losses do not vary among types.

It was argued in an earlier UMC newsletter (FM83-4: "Cost 'Behavior' . . . And Optimal Size in Beef Cows," 5/6/83) that most nonfeed cow costs are feed associated--hence roughly proportional to feed. With respect to the second condition, cost per unit of feed or energy should not vary unless DM intake limitations of different cattle types demand different energy densities in their rations (i.e., different proportion of concentrates or supplemental feeds). The third condition becomes important at both extremes in genetic size. Too large, too small, or too fleshy will likely cause the product to sell at a price discount. Condition (4) is probably violated with large size differences between sire and dam--and calf crop percentages may be some lower with very large-heavy muscled breeds.

Thus, selection for economic merit, while mostly concerned with feed efficiency, must also give place to size per se--as it affects selling price--and to survival related traits such as birth weight, calving difficulty, reproduction and even tractability and manageability (disposition). In fact, for some systems and environments, selection for "trouble-free" cattle could be most important of all. The big challenge, however, would seem to be one of identifying and measuring per head traits that more dependably proxy for energetic efficiency. Early maturity--but in a large enough animal--would seem to hold the greatest promise, if only adequate measures can be developed.

MAKING BEEF PRODUCTION AN ENTERPRISE

by Steve Radakovich
Radakovich Cattle Co.
Earlham, Iowa

Enterprise as defined by Webster means "an undertaking which involves activity, courage, energy or a daring venture." It is not necessary to make beef production any more of an enterprise.

Beef operations, like any business, must keep current on two important aspects - direction and methodology, or where we are going and how we are going to get there.

Advancements in animal breeding and reproductive physiology have pushed seed stock breeders into the fast lane. Information advancements such as breeding values coupled with new techniques such as embryo transfer are causing exciting times. In fact, there has never been a period in history where we can make mistakes more accurately and propagate them faster than now. Having the tools to build a big car is one thing, not knowing if the public needs another big car is something else.

The time is long overdue for individual breeds to identify themselves and define their purpose in the industry, preferably a purpose that does not stand a breed alone but defines what it can contribute to cross-breeding programs. It is also time for the individual breeder to write down his breeding program as it relates to the environment, market demand and management level of his clients. In other words, let's get DIRECTION. It is not logical to lose the assets of Breed A while trying to develop it after Breed B. We already have breed B.

At the present time, the cow-calf man has 50 plus breeds to choose from. He can move his cows in any given direction that he wants. He can make them tall, short, heavy milking, light milking, big, little or whatever. This genetic variation offers the cow-calf man the flexibility he needs to fit his various environments. Let's hope in the future, he can buy an Angus bull to fit the purpose of an Angus bull, or any other breed to fit their individual purposes.

Through the history of pendulum genetics, cattle breeders have been consistently guilty of maximizing single trait selection. We have bred cattle maximum small, maximum thick, maximum deep, maximum big and maximum tall. Corn breeders have realized that several traits such as standability, dry down and ear retention are required in an optimum combination for highest net profit, not merely maximum small ears or maximum large ears. Corn producers also realize that maximum yield, or output, with no regard to input level seldom reflects

highest net profit. Beef is also a dollars and cents business based on several important genetic traits. We as breeders must not fail to balance all important economic traits with regards to minimizing inputs per unit of output. My horse may run faster than yours, but that does not mean he will stop, turn or even be caught.

I think our seed stock industry is changing dramatically. It has been very exciting and enjoyable living in the simplistic era that we have just been through, where it was easy to identify those individuals that could provide a little extra growth in our programs. Single trait selection is much simpler and much more satisfying in the short term compared to systems selection. It would be a relatively simple task to select only for growth today and use all the breeding value information available. Presently, we do not have breeding values that identify cattle superior in the multiple trait concept. Consequently, an individual breeder's job is much more difficult in terms of identifying the animal with the greatest net profit potential. This requires a greater level of understanding, not only of performance records, but also of how genetics relate to a given environment. Obviously, the first question each of us must ask is what are the traits that relate to net profit? They are many and there will be some antagonisms.

Are Maximums the Answer?

Why do we as purebred breeders strive for maximums? The answer is very obvious - we receive recognition for them. Take, for example, the show ring. It takes maximums in the same traits to win a Hereford show as a Simmental show, and the same maximums in an Angus show as a Chianina show. Do these breeds all have the same purpose? Will these breeds all work in the same environment? Even so, most breeders are pushing their breeds in the same direction. The same applies to the breeders aiming for high gainers in central test stations. Show ring and central tests, same song, same tune. A tractor pulling contest is a show of maximizing horse power, yet we all know these competitive tractors are impractical for farm use. My question is: Who is minding the store?

There was an Italian lad that received a telescope for his 10th birthday - one that extends, the kind sailors used to use. The boy complained to his father that the telescope was useless, that he could see better without it, everything looked small. The father turned the telescope around. The father widened the son's outlook and how fortunate that he did. The son's name was Galileo. He later discovered the moons of Jupiter, the rings of Saturn and the mountains of our own moon, as the world's foremost astronomer of his day.

Maybe some of us in the beef industry need to turn our telescopes around. Perhaps we need to look at the entire industry, or at least our own operations, with regard to total input, genetic trade-offs, market demands, available feed supplies and inventory. How can we produce beef from within the boundaries of our fence for the highest net profit? That should be the most important question.

If we examine the history of agriculture in the United States and particularly the history of animal breeding, one truism has always prevailed. More is better. (More corn production per acre, more eggs per hen, more milk per cow, more weaning weight per calf). Relatively low input costs have been an underlying factor for this to be true, but this has changed. A parallel can be drawn with the American automobile industry. When I was in high school, the main consideration relative to a car was how fast it would go. Today we are concerned with how far that automobile will go on a gallon of gas. Efficiency is the watchword throughout our society and the same concept applies in agriculture. Instead of being concerned totally with outputs, we are more concerned about minimizing inputs per unit of output. This applies not only to fertilizer or fuel, but to all cow-calf inputs such as land, labor and capital.

A Systems Approach

We have been using a systems approach in our operation since we first started taking birth weights. Using birth weights as a moderation influence on unlimited increases in yearling weights, we have tried to balance these traits. This is a very simple approach of beef cattle systems. Many are concerned with "systems", believing you must turn your total breeding program over to a computer which employs some sophisticated and little-understood formula for beef cattle selection. This is not necessarily true. The systems approach can be a common sense business approach to any enterprise. It involves inputs and outputs. It involves weights and inventory.

Most commercial producers within our industry, especially cow-calf operators, are very quick to accept this approach. They may not understand the scientific theory behind it, but they do understand the primary concern. Maximizing net profits. They understand this is influenced by day of calving, calf size, and number of calves weaned. They are also very aware of input costs such as vet bills, extra labor, improvements required for inside calving and others that may go into any cow-calf operation.

It is through a systems approach that we finally come to grips in an important way with genetic antagonism. Anyone that has extensive experience with beef cattle breeding knows there must be trade-offs between birth weights and growth, between excessive milk production and between excessive frame and thriftiness. Increases in growth or milk are antagonistic with maintenance cost. This is a serious trade-off because energy for maintenance represents 60 percent of the total energy required per unit of edible protein produced. While commercial producers have been most receptive to the systems approach, the full responsibility for breeding cattle with a high degree of efficiency as evaluated under this concept still lies with the seed stock breeder.

As mentioned earlier, success with the systems approach involves an attempt to balance traits. Perhaps an analogy would be appropriate at this time. Corn production requires several essential inputs - fertilizer, plant population or seed density, rainfall and adequate soil type. These factors must be present in an appropriate balance to achieve successful crop production. The same is true in balancing beef cattle production traits. How much growth can be developed while birth weights and calving ease are still kept in line? Ultimately, the environment is going to have a tremendous impact in determining the most desirable enpoint with regard to mature size and carcass weight. The key is to balance the genetic potential of a herd with its environment.

A major way in which the systems approach differs from traditional production testing is that a systems approach is based upon total pounds of production from a given input of resources, as opposed to just the pounds of production per cow unit. In other words, in the systems approach, we are concerned with the number of cows in addition to the size of the cows which are run within the boundaries of a fence. A greater number of small cows can be run on the same amount of feed as a smaller number of large cows. The question then is which is the most profitable situation? A successful system program will provide the answer.

A Radakovich Cattle Co.

Let me share briefly with you how we attempt to follow the systems concept in our own production situation. Our registered herds consist of Hereford and Angus cattle. The first rule we follow is an attempt to keep our environment very similar to the environment of our customers. If our yearling heifers are not cycling, we are not going to go out and feed them a higher level of supplement, simply because our commercial customers cannot afford to do so and still show a profit. We believe cattle have to work for our customers in order for us to have any longevity in the seed stock business.

As far as bull selection is concerned, it is our policy to use proven sires artificially. As I go through the sire evaluation reports, I look for bulls that meet acceptable levels in the three important production traits listed: A bull must not be over four pounds EPD on birth weight; he has to be plus 50 or more pounds on yearling weight; and he cannot be under 105 on maternal breeding value in the Hereford breed or under 100 maternal breeding value in the Angus breed. Very few bulls listed in the 1982 Angus Sire Evaluation Report met all of these criteria. Once we have identified these individuals, we do a thorough reproductive study and check out their soundness, longevity and disposition, traits that still require visual appraisal.

As you can see, we are not selecting for the extremes. Instead, we are looking for an animal that is balanced and economically sound in the production traits. Obviously, bulls that meet all of our selection criteria are the exceptions. This is one of the real challenges to the animal breeder today and tomorrow. He must look for exceptions that are beneficial to the industry and then propagate them in order to be classified as a true animal breeder.

One of the key factors which indicates how well we have done in balancing our cattle to our environment is reproductive rate, or day of calving. We compare cattle of various levels of production (in a variety of traits) with their position in our calving season. For example, if our largest cows are not cycling back soon enough after calving, and are consequently in the middle or latter third of our season, then perhaps we are getting more size and more production potential bred into our cattle than our environment can stand. Or, when we segregate our cattle according to maternal breeding value and find cattle in the last third of the calving season have the highest maternal breeding values, then perhaps our milk production level has exceeded our environmental capabilities. The same thing could also relate to sire line of females. This is an excellent method of evaluating the compatibility of the environment and the level of herd genetics.

Functional Efficiency

Another concern of ours as seed stock producers that relates to the systems approach is the concept of functional efficiency. We insist on cattle that require a low level management or labor input. For example, we certainly insist on cows that calve by themselves and require no attention to their udders at calving time. One good thing about the short post-calving interval in the beef cattle business: When the beginning of the breeding season rolls around, the fact that we had to wade through the mud, pull calves and milk cows is still fresh in our minds. We remember those cows which are problems during the calving season.

Functional efficiency is one of the greatest concerns to the owner-operator. He is the one who has to calve the cows and live with them on a day-to-day basis. We select for functional efficiency basically by selecting against those cattle that are inefficient. We keep 90 percent of our heifers. If they do not breed or calve easily, then they are culled. If we have a cow that insists on us working for her instead of vice-versa, she is culled. The only way to avoid having these problems creep into a cow herd is to cull against them.

I come from the Midwest where cattle are a low priority agricultural enterprise. Basically, they are viewed as utilizers of areas otherwise wasted. In other words, they are used to clean up fence rows, waterways and pasture gounds that cannot be cultivated. In order to be profitable they must be required to have low-intensity management, low labor and low cash inputs. They must be able to do it on their own. The typical Iowa farmer is highly skilled in grain and hog production where there is a larger potential for net profit. Cattle, on the other hand, must function as ruminants to utilize waste feed or by-product feeds from these other operations. In order for cattle to work in this type of situation, they must be low maintenance and self-preserving. They must be able to reproduce with a minimal amount of difficulty at two years of age.

I encourage breed associations to do their best to emphasize the need for functionally efficient cattle. It is difficult to find a way to glamorize or promote reproduction, maternal traits or functional efficiency instead of simply identifying frame size. Unfortunately, size is glorified in the show ring and test stations.

There is no free lunch in cattle production. Any extra level of production has to come from additional inputs in the form of feed resources and management. We as seed stock producers have a moral obligation to select and identify cattle which can make the greatest genetic contribution to the profitability of our total industry.

ECONOMIC EFFICIENCY IN BEEF PRODUCTION

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The criterion of "economic efficiency" to be employed in this discussion is the bottom-line "surplus"--or net return remaining to pay for use of the "fixed" inputs or resources of the individual rancher or cattle producer. In short--the bottom-line net profit for the ranch.

To some, this preference for a lump-sum residual profit may seem too obvious to merit attention. To others, however, it may seem a bit astray from the input-output ratios they more commonly think of as measures of efficiency. Thus, some discussion on this point may be warranted.

oo Economic vs. Biological Efficiency. For reasons of simplicity, we commonly employ biological efficiency ratios as hopefully valid "proxies" for or "indicators" of economic efficiency. Such ratios include beef per acre, weight weaned per cow, TDN per lb. gain, etc. Such "proxies", however, are often not accurate indicators of economic efficiency--and can often lead to quite wrong and unprofitable decisions. A few simple examples should suffice.

Backgrounding--or the "growing-out" of a 4 cwt. calf into a feedlot-ready 7 cwt. yearling on pasture and hay--is sometimes alleged to be "inefficient" by the criterion of TDN per cwt. of gain. And, by such a purely biological efficiency criterion it is indeed "inefficient," as it may require over 9 lb. TDN per lb. of gain while the same gain may be produced with only 6 lb. TDN/lb. gain if produced twice as fast in a feedlot. But, if the TDN costs only 3½¢/lb. from pasture and hay--and 7½¢ in the feedlot ration--then the comparative energy costs per lb. of gain are 31½¢ in range-based backgrounding (or 9 lb. TDN @ 3½¢) vs a much higher 45¢/lb. in the feedlot (or 6 lb. @ 7½¢).

Similarly--even "beef per acre" can be highly suspect as an efficiency or profitability criteria. If 'Pasture A' produces 400 lb. beef per acre and 'Pasture B' only 300 lb., 'A' appears to be 33% more productive. But, on

closer inspection we might find 'A' carries two (2) steers per acre that gain 200 lb. per head for the season--while 'B' carries only one (1) steer per acre--but it gains 300 lb. over the season. In the U.S. at least, negative price margins plus per head ownership costs claim about the first 150 lb. gain per steer during the pasture season--leaving only the "surplus" gain per head (or gain in excess of 150 lb. per head) to pay for the pasture. Thus, this "surplus" gain on 'Pasture A' is only 100 lb. per acre--or (200-150 lb./head) times 2 head per acre. 'Pasture B's' surplus gain is 150 lb. (or 300 lb./hd. minus 150 lb.). Thus, despite producing 33% more beef per acre, 'Pasture A' is only worth 2/3 as much pasture rent as 'B' (or 100 lb. vs. 150 lb. "net" or "surplus" gain per acre).

Even weight weaned per cow can seriously mislead if the cows being compared have different nutritive requirements. If the basic ranch resources will carry 20% more 1000 lb. cows weaning 420 lb. calves than it will 1400 lb. cows weaning 500 lb. calves, then the total weight weaned will be slightly more with the smaller cows weaning lighter calves.

oo Efficiency Ratios vs. Lump-sum Residuals

Most of the weaknesses of the biological efficiency ratios discussed above can be corrected by simply converting both inputs and outputs to monetary values. Thus--dollars product per dollar of inputs--or dollars of input per dollar of product are "economic" efficiency ratios.

Unfortunately, a major share of the inputs in range cattle production are often "fixed", provided by the proprietor, and not valued or priced by regularly recurring market transactions. Such inputs include the basic "ranch package"--the owned rangeland and the proprietor's labor-management input. Placing a cost or value on these inputs is both difficult and prone to serious error. The seriousness of this problem can be quickly seen in a simple example.

In the author's home state of Missouri, an acre of pasture that produces perhaps 3 AUMs of pasture could have had a market value of $400 or more in recent years. At a mortgage interest rate of 13% the interest on $400 would be $52 per acre. Adding in $8 for variable costs, would push the total per acre input to perhaps $60 per acre. Thus, the total cost per AUM would be at least $20 (or $60 ÷ 3 AUM).

Now, in this Missouri example, would it be efficient to add a $15 fertilizer treatment if it would produce an additional AUM per acre? It would certainly reduce the calculated or "book" cost per AUM from the initial $20--down to $18.75 per AUM--or ($60 + $15) ÷ 4 AUM. But, despite this seeming improvement in our economic cost ratio (from $20 down to $18.75 per AUM)--it would also reduce net ranch profit unless we could realize a net use or sale value of at least $15 per AUM. And, in Missouri, the market lease price per AUM is only $6 to $7. In short, our total per acre loss would only be increased--despite the reduced "book" cost per AUM.

The problem is that Missouri grassland (and U.S. grassland) has been severely over-valued in the market as people over-bid in anticipation of continuing land price appreciation.

The most relevant comparison would be to compare the bottom-line net returns remaining to pay for the use of the fixed land resource==whatever its market value.

In this example, 3 AUMs @ $6 per AUM minus non-land costs of $8 leaves a $10 per acre net rent for the land. If the $15 fertilizer treatment is used, we have 4 AUMs @ $6 minus ($8 + $15)--or a net rent of only $1 per acre! Thus, regardless of what we may calculate as a total "book" cost of our pasture, it is profitable to increase production only when the added revenue (or $6 per AUM) exceeds the added cost (of $15 in this example). Land costs, in effect, are irrelevant except when sale or purchase of land is at issue.

So long as any package of inputs is essentially "fixed"--not being bought or sold on the market--its value or cost is indeterminate, and the residual return remaining to pay for it--net of all other deductible costs--is the most relevant efficiency target. In short, we try to maximize the bottom-line net ranch profit.

AN EXAGGERATED CONSUMER PREFERENCE: THE SURVIVAL IMPERATIVE OF THE BEEF INDUSTRY!

While improved efficiency in beef production is often much extolled as the "panacea" of the beef industry, the real hope for economic viability of the industry rests with a continuation of an exaggerated consumer preference for beef over most of its lower-priced competitors. A few pennies cost (or price) reduction at retail is but "peanuts" when $2.40 per lb. beef has to compete with what is often only 40¢ to 50¢ chicken. There is NO WAY that beef will ever be cost-competitive as a concentrate-consumer with either poultry or pork! The one-calf per year "natural" production system of the beef cow is not reproductively in the same league with 150 broilers per year per mother hen--or even with 15 pigs per sow. While the beef cow produces less than her own weight in progeny in a year the broiler breeder hen produces 100 times her weight!

Nor is energetic efficiency in the feedlot ever likely to approach the broiler, the turkey, or the hog. Seven to eight pounds of feed per lb. live weight gain is nowhere close to the 2 lb. or less of the broiler--or even 3 to 4 lb. for the hog. In the rumen, the energy losses are simply too large in converting concentrates into edible meat.

Thus, the economic viability of the beef industry rests first on a very pronounced consumer preference--and on its ability to produce a preferred product from coarse feeds not suitable for consumption by monogastric animals --whether they be humans, poultry, or swine.

I especially worry about this dependence on an exaggerated consumer preference as I look at recent demand shifts and industry responses. It's no secret that beef, in particular, and red meat, in general, have lost demand in recent years. Despite the smallest calf crop since 1961, U.S. cattlemen are realizing such unsatisfactory prices they are continuing to reduce numbers. Beef demand loss is creating a crisis in the industry. Nor is there any real concensus response by the industry that lends much encouragement. We badly need a grading system that more accurately reflects consumer preferences.

Factors such as tenderness need to be accurately identifiable in the live animal and reflected in the price structure of breeding stock. Michigan State University, for instance, long ago demonstrated heritability of tenderness in beef cattle, but lacking grades and means of identification, this heritability remains unexploited. It seems imperative that the beef industry recognize that "acceptability" of our product is nowheres near enough, when we face much lower priced competition. A sufficiently large consumer preference to pass up 50¢ chicken to buy $2.50 beef must be our target!

UNDERSTANDING THE ECONOMIC NATURE OF THE BRUTE

Before discussing the comparative efficiency or profitability of alternative production practices and systems, it is first imperative to understand certain economic characteristics and uniquenesses of the industry. The first step to making better decisions is to "ask the right questions--and this requires an understanding of the place and role of beef cattle and of their unique economic attributes.

oo Feeder Cattle Production is Still a "NATURAL" System.

While feedlot finishing is an "un-natural"--or a "hot house" type production--as we place a ruminant animal on a concentrate ration--the basic feeder cattle production is still a "natural"--one-calf per-year system. Compare this with the "hen"--whom we prohibit from setting on her eggs or brooding her chickens. In effect, we have bred and selected for an "irresponsible hen"--that will continue to lay eggs and fail to go "broody." Or, compare the beef cow with the dairy cow--whom we've bred and selected for a milk flow far beyond the need or intake capacity of her calf. And, we feed both the dairy cow and hen an un-naturally high energy ration to accommodate their un-natural production.

Now, what do we demand of the beef cow that "survival of the fittest" didn't also select for long before man domesticated her? Adequate milk for one calf, fertility, ability to digest fibrous foodstuffs, mothering instinct,--all had survival value long before man's selection began. Our selection for these traits is almost limited to selecting back out the "bad stuff" that man's prior selection let creep in!

Docility of disposition, color, polledness, shortness of muscle, and fat depot locations are about all that's left that wasn't pretty well "milked out" through natural selection before man even started selection of the bovine. In short, because it's still a "natural" system, the opportunities in genetic advancement are far more limited. Thus, we often say that some of the most important traits (such as fertility and reproduction) have "low heritability." What we probably should say is these traits were pretty well selected for by nature--leaving less potential for man to deal with.

oo Price-Determined vs. Price-Determining Costs of Production.

The costs of feedlot finishing of beef cattle are price-determining in nature. In effect, whatever it costs to put on a cwt. of gain in the feedlot, that's essentially what the actual price or value of feedlot gain will average over any reasonably long period. If you will take the value of an 11 cwt.

choice steer at Omaha and subtract the cost 4 mo. earlier of a 700 lb. feeder steer at Kansas City you will find, for instance, that the difference averages about the value of 85 to 90 bu. of corn. Or, stated somewhat differently, the feedlot is going to receive the value equivalent of about 20 to 22½ bu. of corn (U.S. farm price) for a cwt. of finishing gain. Because of errors in expectations and forecasts, this actually received price of gain may balloon up to 30 or more bu./cwt. when he receives windfall profits--or shrink to as little as 10 to 12 bu. when the industry suffers its occasional "wreck". But, over a 3-year or so period, it tends to average out at the 20 to 22 bu./cwt. level--regardless of what the prices of corn or fed cattle are!

The mechanism is the compensatory bidding practices for feeder cattle. Thus, if fed cattle bring $60 and corn is $3, we can expect 7 cwt. steers to ultimately average about $57/cwt. . . . or (11 cwt. @ $60 - 87 bu. @ $3) ÷ 7 cwt. But, if corn dips to $2/bu. while fed cattle stay at $60, the 7 cwt. steer will ultimately rise to perhaps $69/cwt.--or (11 cwt. at $60 - 87 bu. @ $2) ÷ 7 cwt.

Thus, because most of the inputs must be purchased in the market and bid away from many competing uses, the product price (price of the feedlot gain) is "cost-determined." There will, of course, be short "disequilibrium" periods in which feedlots enjoy windfall profits of $100 or more per head--or windfall losses of similar magnitude--but these will be quickly dissipated through rising or falling bids for the feeder animal.

What of cost-price relationships for feeder cattle production? Here, the relationship is much looser, less dependable, and cause-effect direction may be reversed. Thus, when feeder cattle prices either rise above or fall below calculated costs of production--will they quickly adjust to a full cost equilibrium? The answer is no, because many more of the inputs are essentially "price-determined" in nature. Instead of range-land prices "determining" calf prices--calf prices will ultimately determine the price and value of the rangeland. This effect was badly obscured or covered up in the past decade--because something else was having a powerful influence on rangeland values--at least in the U.S. This powerful price influence was a growing expectation of ever faster land-price appreciation--fed by the 1970s acceleration of a 40-year history of "ever-upward" land prices. In short, land produced a "joint-product"--including its present productivity supplemented ever more by a growing "speculative" product of "capital gain." The credibility of the latter product (speculative gain) is gradually collapsing in most of the U.S.--and economic productivity is slowly becoming the major determinant of land prices.

Range land--in particular--tends to be product-price-determined (rather than "determining") because of its limited uses. In most of the U.S., its primary alternative uses are either calf production or backgrounding. Thus, rather than calf prices being forced up by land prices, land prices are more likely to be forced down to whatever level calf prices justify--once the capital gain expectations dissipate.

oo The High Investment/Slow Capital Turnover Challenge

Unfortunately, range-based feeder cattle production is about the highest investment sector in all of agriculture per dollar of product. Typical numbers in recent years for Missouri's cow-calf operations include 4 open acres per cow (3 acres pasture plus an acre of hay) at $500 per acre to total $2,000 real estate. Add $500 for the cow and share of bull and replacements--another $500 for pickups, tractors, balers, etc.--and we can invest $3,000 per cow! Divide this $3,000 by the $245 per cow net production that Missouri MIR cow-calf producers typically average, and we have a capital:output (or capital turnover) ratio of something over 12:1.

Just how serious this slow capital turnover really is can be seen in Table 1, where 1982 average percent returns on investment are paired with various levels of this ratio for 302 Missouri MIR cooperators. Net percentage return on investment quickly drops from a high of 18.9%, with a capital:output ratio of only 1.0 to 2.0 (very fast!), to a negative return (-2.6%) on those 27 farms with a ratio larger than 9.0. Considering our 12:1 ratio for the typical beef cow, we can see why beef cows in Missouri usually represent only a "part" of the total farm business--and are typically combined with other faster turnover enterprises such as hogs, corn, soybeans, rented cropland--or with off-farm employment.

TABLE 1. Percent Returns of 302 MIR Farm Businesses in 1982, Grouped by "Capital Turnover"

"Capital turnover" (operator's share)*	Number of farms in the group	Average Percent return on total assets (Oper. share)
1.0 to 1.99	17	18.9%
2.0 to 2.99	40	10.4
3.0 to 3.99	69	5.4
4.0 to 4.99	57	4.6
5.0 to 5.99	38	1.8
6.0 to 6.99	20	0.6
7.0 to 7.99	19	0.1
8.0 to 8.99	15	0.7
9.0 plus	27	(-2.6)

*"Capital turnover" = capital:output ratio, which = (operator's average total assets) ÷ (operator's value of farm production).

In another way of looking at it, 13% interest on a $3,000 per cow investment would all by itself claim 159% of the total $245 product per cow!

Of course, we can't really blame the cattle for our willingness to overprice the land. The reason we paid $500 for an acre that we could lease for $20 was our expectations of future price appreciation of that acre. After a compound

annual appreciation rate of 14.6% on all Missouri farm land during the 1970s, we simply started paying for a lot more than just the productive worth of the land.

While the above is based on only one state in the U.S., similar very high investment:product ratios are characteristic of the U.S. feeder cattle sector wherever you choose to look.

oo Are there remedies for a too slow capital turnover?

Three remedial approaches can be identified: (1) avoid ownership of assets by leasing. (2) Offset slow turnover enterprises by combining with faster turnover enterprises. And (3) Increase yields per acre and per cow to reduce the capital: output ratio.

In the U.S. the first two remedies are commonly employed. Leasing of both privately and publicly owned grassland is common. And, in the humid half of the cattle industry, feeder cattle production is commonly a supplemental enterprise to other grain and livestock products--and also to off-farm sources of income.

The third alternative, of increasing yields and performances, is the one around which most of the discussion of "good" vs. "poor" management is staged. Should we fertilize pastures more (or less) heavily? Should we feed our cows better--or cut feed costs more? Should we spend more (or less) time on our cows? Do we over- or under-treat for parasites, diseases, etc.? This set of management questions lends itself to widely differing viewpoints because of uncertainties as to how economically responsive beef cows and forage really are to yield or performance-enhancing practices.

We will now look at why these enterprises are "extensive" in nature and see what management inferences can be drawn.

oo The Meaning and Causation of "Extensive and "Intensive" Enterprises

A moment's reflection will tell us that agriculture presents a very wide range of enterprises that vary from the very "intensively" managed to the very "extensively" managed. At one extreme are high value horticultural crops and intensive animal production--while at the "extensive" extreme are timber and much semi-arid range cattle production. The reasons for these differences lie in the differing economic responses to yield and performance-enhancing technologies and management practices.

Gross return per unit of feed energy varies widely between "intensive" and "extensive" enterprises. Table 2 contrasts the gross value of products produced per lb. of TDN required for milk, hogs, broilers, and feeder calves. Note that the gross product values of the first three are well over twice the expected cost per unit of TDN from about any source. For them, efficiency of energy use is basically maximized when intake is maximum--permitting a higher proportion of the energy to be used for production--as opposed to body maintenance. Even if other (or non-feed) costs claim half the gross product value, there still remains from 6¢ to 11¢ per lb. of TDN to pay for the feed energy for dairy, hogs, and broilers.

TABLE 2. Comparative Gross Product Values Produced per pound of TDN used in Production of Alternative Livestock Products

Species and/or Animal Product	Unit	Value per Unit	TDN Required per Unit	Gross Product Value Produced per lb. TDN fed
Dairy Cow	Cwt. Milk Equiv.	$13.50	60 - 90#	15 ¢ - 22 ¢
Hogs	Cwt.	45.00	290 - 310#	14½¢ - 15½¢
Broilers	Lb.	.30	2.0 - 2.4#	12½¢ - 15 ¢
Feeder Calf	Cwt.	65.00	1000 - 1200#	5½¢ - 6½¢

The beef cow, however, presents an entirely different feeding challenge. If other or non-feed costs claim half of the gross product produced per lb. TDN, then only 2 3/4¢ to 3 1/4¢ remains to pay for the feed. Only unharvested pasture supplies TDN at a cost at or below these figures. Leased pasture at $6 per cow month approximates 2¢ per lb. TDN--while even $50 per ton grass hay costs 5¢ per lb. of TDN.

Thus, the really relevant feeding objective for the beef cow is one of minimizing the cost per unit of TDN . . . rather than maximizing productivity! This means, for most of the U.S., a maximal reliance on unharvested pasture or range.

An additional reason that discourages feeding for maximum product is the non-saleability of much of the added product with the beef cow. While higher nutritional regimes can produce more product per cow--even more per ton of TDN--half or more of the added product may be on the mother cow's back--and thus not saleable till you sell her!

Gross return per unit of fertility removal also varies widely among crops--and helps explain why some are intensively fertilized and others hardly fertilized at all. A way of gaining some economic perspective on optimal "management intensities" of alternative crops is to examine their "standing-in-the-field" (or unharvested) values per unit of fertility removed. Table 3 compares corn grain, grass hay, and alfalfa hay with typical midwestern U.S. prices. All necessary costs of harvesting, handling, drying and transporting must be deducted from the value of the product to arrive at what the producer actually would receive for producing an added bushel or bale. Even with a relatively low price of $2.30 per bu., corn still nets $1.85 for an additional bushel that removes only 30¢ worth of fertility. Thus, fertilizer could be profitably used on corn so long as it is transformed into added product with greater than a 16% efficiency. In contrast, the standing-in-the-field price of only 45¢ (remaining from the $1.25 bale) for the grass hay would justify using fertilizer only so long as it was being converted to added yield with better than a 71% efficiency! Such an efficiency is difficult to find.

TABLE 3. "Standing-In-The-Field" Crop Values vs. The Value Of The Fertility Removed for Corn, Grass Hay, and Alfalfa Hay

Crop	Unit	Value/ Unit	Minus Harvest & Handling Cost	Value Standing in the Field	Approx. Value of Fertility Removed[1]
Corn-grain	Bu.	$ 2.30	0.55	$ 1.85	$0.30
Grass Hay	50# Bale	1.25	0.80	0.45	0.32
Alfalfa Hay	50# Bale	1.75	0.80	0.95	0.10

[1]Calculated at 25¢ N, 26¢ P_2O_5, and 15¢ K_2O.

In contrast, the alfalfa hay with its larger value per unit ($1.75 vs. $1.25) leaves an unharvested value over twice as high (95¢ vs. 45¢)--and because of it fixes its own nitrogen (no N-fertilizer charge for N-removal) has a fertility removal charge of only 10¢ per bale (for .25 lb. P_2O_5 and 1.2 lb. of K_2O). Thus, P and K could be applied up to where transformation efficiency dropped to less than 11% (or 10¢ ÷ 95¢).

Thus, many of our perennial forages are much like the beef cow in their economic responsiveness to yield and performance enhancing inputs and technologies.

FINESSING MORE FROM THE BEEF COW

Feeder cattle production is a high investment business with slow capital turnover. Yield and productivity enhancing treatments are discouraged by low gross returns to both feed energy and plant food. Further, the tendency for much of any nutritionally-induced added product to accrue in the non-saleable form of a heavier cow also impedes more intensive nutritional management. Nevertheless, opportunities do exist for improved economic returns for most cow-calf producers. We need to know the strengths and weaknesses of beef cows and perennial forages. We need to realistically appraise their economic roles--and plan accordingly. And, we have to discriminate among alternative yield-increasing practices. In short, we have to "finesse" all we can out of nature. Some suggestions follow:

oo Confine perennial grass to land not adapted to intensive crop production. A $200 crop is often a high cost to give up to gain a $20 crop--even with less annual production cost.

oo Adjust beef cow numbers to the forage land available. A beef cow is an efficient machine for converting fibrous roughages into man's favorite meat, but inefficient in utilizing concentrate feeds that are adequate for man and other ruminants.

oo Stock conservatively. Only snow cover should force the beef cow from the 2-3¢ per pound TDN in unharvested pasture to the 5¢-10¢ TDN of harvested forages and concentrates.

oo Let Bossy Do Her Thing! The beef cow is an efficient energy storehouse. She can store up energy when forage quality is high and cheap and burn it off when quality is low and high-cost. She can clean, nurture, and save a newborn calf in subzero weather--with just a little natural protection from the wind. She can harvest forages from land too steep for a tractor. Most will even dry up and wean a calf automatically when next calving becomes imminent. Nature has equipped her to take care of most of her and her calf's needs--permitting her owner to concentrate on earning needed income elsewhere. Indeed, she's a wonderful machine at doing what nature programmed her to do. Sometimes all we have to do is let her do it.

oo Where rainfall permits--let legumes do their thing! While grass has been called the "foregiveness of nature," legumes should be called nature's "bootstrap" forages. For a little seed and establishment opportunity, they offer a nitrogen-fixation and protein-production factory, higher total forage yields, and improved quality and animal performance. Some are only short-lived perennials or annuals, but natural reseeding (or "volunteering") occurs with many wherever the grass offers an open space or access to sunlight. Vigorous sweet clover on road banks with little or no topsoil (hence low N-fertility) symbolizes the "bootstrap" opportunities these N and protein factories offer many pastures from which the topsoil was eroded by excessive tillage in prior years.

oo Get all the "somethings-for nothing". The 10-20% increases in productivity promised by crossbreeding represent a high return for just alternating the colors of one's herd bulls.

oo Get a full year's work for a full year's feed. Calving should occur as early as practical relative to planned sale date. The cheapest extra 50 pounds in weaning weight is still just an added month of age.

oo Balance need to feed vs. feed to need. Beef cow milking ability can be balanced to forage availability and quality. Seasonal need can be balanced to seasonal availability and quality by adjustment of calving season. Ideally, calving date should precede lush pasture growth by 2-3 months.

oo Select cattle to fit your system and environment. For many this suggests a goal of essentially "trouble-free cattle." There's always a market for the breachy cow, the fat cow with the thin calf, the cow that needs help at calving, or the slow breeding cow that always calves late. Select and keep cattle that work for you--not those that make you work for them.

oo Try the "busy man's culling system". Many commercial cattlemen probably won't spend the time to tag and individually identify all cows and calves in a formal performance testing program. All could, however, utilize a very simple means of identifying the slackers. When weaning or sale time approaches, pull the calves off their mothers for a half day or so until they're ready to nurse. Then turn them

back with their mothers and sort off and sell the mismatches--the heavy mature cows nursing lighter or later calves. Whether the calf is too light because of poor milking or because of late calving is of little consequence. In either case, sell the pairs where a large hay-burner is weaning a small dividend. Also, sell those cows that wean no calf at all.

oo Scrap the "Ideal Animal" Myth and select for trait balances that fit your system and environment.

oo Make modest use of "reach"--or larger sires than dams, but avoid excess calving difficulty costs of getting too greedy.

oo Seek "optimal tradeoffs" between milking ability and reproduction, between growth and calving difficulty, between productivity and manageability. "Trouble-free" cattle is often a relevant goal.

We should also note certain modest cost practices that commonly are profitable --such as growth stimulating implants, worming when justified, and preventive innoculations for diseases that present a credible threat in your area.

In general, however, profitable management of extensive range-based cattle operations generally requires that we--

.. get rid of the "Home-Run Mentality";
.. forget "maximums" and seek "optimums";
.. take all that nature gives us;
.. look for all the "somethings-for-nothings" (heterosis);
.. abandon any "Nothings-for-something" (over-feeding); and
.. look for the "cheapies".

In brief, we have to fully recognize--and take full advantage of--the basic "Nature of the Brute."

"BEEF IT UP"

Karen Skaykewich
University of Manitoba

I was asked to speak to you tonight on the subject of new product development, and I intend to cover that topic first in a general way, and then, more specifically as it relates to meat and to beef in particular. While you, as cattle producers, are not directly involved in this activity, new product development does affect you because it influences the marketability of your product.

A scientist does not just walk into a lab and say one morning "I think I'll develop a new product". Product development, ideally, is part of a well thought-through plan, resulting in a product that satisfies the wants and needs of specific consumers. If the product meets consumer needs, it will be purchased and used - If not, it will be ignored, to join the multitudes of new products that fail. Remember, there are many more failures than successes in the new product area.

My plan for tonight is to give you an idea of how companies develop new products, the types of products that have been developed over the past few years and finally to let you know what I think might be useful strategies to encourage beef consumption, and why these strategies just might work.

One of the first steps in developing a new product is to decide who your consumers (or purchasers) are and what they are like. Canadian families are the users of food products, and an understanding of today's families should help to predict what sort of products they might use. Let us begin by taking a look at the Canadian family, how it has been changing over the past few years and how it is expected to change in the future.

1. Families today are smaller, with fewer children, and the first child is often born to older mothers, who have been educated and perhaps have a career.

2. More wives and mothers are now also wage earners, and this has increased family incomes. Thus, whereas money may have been the limiting resource previously, the importance of time now takes on new significance when food purchases are made. Working women need "quality" time with their families, and the use of convenience foods frees time that might, at one time, have been used for meal preparation. Meals are becoming more informal, and less important as family meeting places. The structure of meals has changed, also. Several studies conducted by Good Housekeeping Institute have reported that 59% of consumers surveyed said they never serve an appetizer, and 21% said they never serve dessert with dinner.

3. The population of Canada is an aging one. In 1985, the 25 to 34-year age group made up 17.7% of the population. The size of this segment of the population suggests a short-term trend toward growth among families with young children. As this group ages, sheer numbers will exert an influence on market demand.

4. Canadians are becoming more health conscious.

Recent technology has influenced products appearing on supermarket shelves. One technological innovation that has improved foods available to the consumer is the introduction of PET (polyethylene terephthalate) trays as the ultimate in convenience packaging for frozen dinners and entrees. These dishes are attractive, safe for use in both conventional and microwave ovens, and disposable. The size of family incomes coupled with perceived increased value of time has meant that some food products, which at one time would have been considered overly expensive, are now purchased on a regular basis. One of the recent trends in the food industry is the introduction of a large number of relatively high-priced frozen dinners, such as McCain's Lite Delite Dinners and Campbell's Le Menu Dinners. These are aimed at the upscale, one to two member households. The dinners are relatively light, (Le Menu dinners contain 300-500 calories) and are very convenient. They are packaged on disposable PET trays so may be safely prepared in conventional or microwave ovens. In Canada, there are 8 varieties of Le Menu dinners available, priced to sell from $3.99 to $5.49. The emphasis on these types of dinner is high quality, attractive presentation and desirable food combinations; in other words quality is not sacrificed for convenience.

Consumers are concerned about food prices but they are not willing to sacrifice food quality for a low price. Consumers equate high quality with a safe, nutritious, healthy product. A product that is "healthy" to

5. The Canadian population is better educated.

These changes, and others, are no secret, nor is it any secret that the nature of the products that best meet the needs of the Canadian family must also change.

Have food companies responded to consumer needs? The answer is an emphatic YES. The food industry is an innovative one, entering many new products into the marketplace each year. In 1984, Food Engineering reported that over 1000 companies in the United States introduced 3,340 new products, and that this was comparable to the number introduced the previous year. As the food market is a highly competitive one, companies use a wide variety of techniques to ascertain what the consumer wants, needs and (hopefully) will buy. Although philosophies vary, most top ranking companies consider new products not as items that offer short-term returns, but rather an long-term investments. Nabisco Brands' Chairman, Robert M. Schaeberle, speaking at the National American Wholesale Grocers' Association Meeting in Montreal, September 21, 1984 stated "New products are to a business enterprise what raindrops are to a parched lawn. They build it up. They improve it. They keep it healthy and alive".

eat may mean it is low in salt or sodium, sugar, calories, caffeine or fat (but still be equivalent in taste, texture and eating qualities to the "non-healthy" product). Ron Schaeberle of Nabisco brands summed it up by saying "Sometimes I think by being nutritious consumers mean not more nutrients but less of everything - calories, sugar, salt, additives, flavors, colors - and so on."

More and more so-called "lite" foods are appearing in the Canadian marketplace, although the definition of "lite" is rather nebulous. Aspartame (Nutra Sweet) is replacing sugar in many familiar foods and beverages. Canadians can find most brands of soft drink as well as gelatin desserts, sweetened tea mixes, fruit-flavored beverages, chocolate milk mixes and even cereals sweetened with aspartame instead of sugar. Lite beers and low alcohol beers are now being produced for consumers who desire a product with more of less. New to the alcoholic beverage market are the "coolers", a mixture of citrus juices and wine.

Some foods and some food products are purchased because they are perceived to contain more of some desirable nutrients, such as fibre or vitamins. "Natural" foods are perceived as being more nutritious than "artificial" ones.. In 1984, Food Engineering's "miscellaneous snack" category contained a wide variety of products aimed at the "natural food" consumer.

These, then are some products that have been developed by food

companies over the last couple of years. What has the meat industry been doing? Here I'll mention a word I'm sure you don't want to hear - McNuggets. I don't need to tell you that poultry products are selling well - nuggets, dipsters, drumlets, chicken burgers, chicken chunks... the list goes on and on. As of 1983 McDonalds became the second largest seller of processed chicken in the world -second only to Kentucky Fried Chicken. Why? Because they responded to consumer needs.

Has the red meat industry been standing still? The answer is no, as I'm sure you are aware. Meat advertisements are attempting to appeal to the health-conscious consumer. In one survey, 20% of women said they were eating less beef because they were concerned about health. (Expressed concerns were related to fat, cholesterol and calories). To try to appeal to the health conscious consumer, the new beef promotion slogan is "Lookin' Good Beef", and stresses the nutritional value of the product.

New products for the meat category ranked first in the U.S. in 1984, according to an analysis of new products undertaken by Food Engineering. (The category was called "Meat, processed and/or refrigerated" so there is no way to determine how much was beef). Most of the new products were processed, convenience-oriented items which were designed to cater to small families and the improving economy. You may also have read in the December 5 Manitoba Co-operator that the pork industry in the U.S. is moving from commodity-type products to value-added items.

What, then, might be done to encourage beef consumption? I don't pretend to have all the answers, but maybe together we can determine some possible alternatives. If two heads are better than one, a group this size just can't lose.

Let's take another look at Canadian families, and try to determine what types of products might appeal to them:

1. Smaller families.
2. More wives and mothers are now wage earners
   - A. Money less important to SOME consumers so consider value, not just price;
   - B. Time is important;
   - C. Meals are more informal.
3. Aging population with a short term trend of families with young children
   - A. Children - what do they like? e.g. sweetness, ease of eating
   - B. Older people (viewed by the hospitality industry as a new leisure class).
4. Population is health conscious.
5. Population is better educated.

So, what should your group be doing?

1. Support the Beef information Centre. My feeling is that the so called health craze is not a craze at all, but a long-term interest in having a healthy lifestyle. Show consumers how beef can be a part of it. I have never seen beef consumption promoted by "health food" groups, but you know and I know that it is healthy food. The new information on lean Canadian beef needs to be passed on to consumers!

2. Be conscious of the image of the meat industry and realize that the consumer views it as one entity - from the farm all the way to the plate. Reports of American inspectors refusing meat from a substandard packing house affects the entire industry. Remember that when the consumer chooses a roast from the local supermarket, she can't tell where it has been. Negative reports put your entire industry at risk!

3. Encourage product development, and I'm not talking about recipes. The process is expensive, and requires consumer input all along the way, but in the end, product development is, I feel, the way you must tackle the problem of declining beef consumption. What is needed is to provide consumers with products they want and will buy. It might best be summed up with the marketing phrase "Make what you can sell instead of trying to sell what you can make".

Prepared for: MANITOBA BEEF SEMINAR
Agricultural Extension Centre
1129 Queens Avenue
Brandon, Manitoba R7A 1L9

Date of Seminar: January 20, 21, 22, 1985

"THE CASE FOR THE YEARLING BULL"

Prepared by: Paul D. Redd
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The last few years have been extremely challenging for the beef industry. The National Cattlemen's Association in the United States hasn't offered any easy solutions or blamed anyone else for these hard times. The NCA has challenged the industry to find ways to become more efficient. "Leave no stone unturned in looking for ways to squeeze expenses and, ways to improve production efficiency." If you are not using YEARLING BULLS in your program, you leaving under a rock 20% to 25% of your bulls capacity to produce calves!

Before you begin to ask which damp rock I was found under, let me show you a little of our cattle "range". Ours a is "Range" operation with mother cows living year around on the range. After calving as a two year old, cows go to the range and never see another bite of silage or hay until they are culled from the herd.

The Summer Range is high; with elevation from 7500 to 10000 feet. This is our best range; with average capacity of 7 1/2 acres per cow per month. That is 38 acres per cow for five months (June - October). Approximately half of the Summer range is leased from the Federal and State governments at reasonable rates.

The cattle are managed in two basic divisions: commercial and registered. The registered cattle include: Hereford, Red Angus, Simmental, Barzona, Gelbvieh. The commercial herd is largely made up of Red Angus x Hereford cows; they are the testing ground for the registered cattle. The registered cattle are artificially bred June 1st to July 10th, with clean up bulls following until August 1st. The Commercial cattle are bred via natural service with the bulls in June 1st and removed at weaning time (October).

In the Fall, the calves are weaned then hauled down the canyon just 18 miles to Paradox Valley, elevation 5200 feet. In Paradox, they are preconditioned for three weeks then started on one of three courses: bulls good enough for the bull test go on test, steers and cull heifers and culled steered bulls are warmed up to 650 lbs., replacement heifers are grown out at 1 to 1 1/2 lbs. per day gain.

The cows are pregnancy checked, vaccinated and, culled based on pregnancy, production and age. Every open cow is culled. Every dry cow is culled unless we know for certain it was not the cow's fault. In most cases we don't have an excuse; when in doubt, cull.

The winter range is roughed and extensive. It takes 22 acres per month per cow; or 154 acres per cow for seven months. Some of range is nearly all rocks and "cedar" trees and requires nearly 700 acres per cow for the seven month winter. Water is short most of the time. Earth dams, intermittent streams, wells, springs, melting snow, and hauled water are all used to provide water on the desert. The Winter range elevations are lower: 4500 to 7000 feet. We supplement the cows with rock salt from November to February. Twenty days before calving we begin supplementing the cows with a loose mix of Cottonseed Meal, rock salt and, grain in open barrels.

The coming two year old heifers calve in February and March. Cows with healthy calves go to the range. Those with calving problems are culled. Cows on the Commercial range calve unassisted and unobserved. The Registered cows also, calve unassisted and mostly unobserved. These new Registered calves are roped, tagged, and weighed on the range at two or three days of age. Both Registered and Commercial cows must bring a calf to the branding corral or be culled. Following branding, the cows are sorted for breeding.

Meantime in Paradox the bulls calves have finished the performance test and the top 60% have been sold in our annual auction sale. This year's sale is April 19th with 200 bulls. Most of the bulls are sold to ranchers within 300 miles of Paradox. We deliver, free of charge, 300 miles.

The bulls are important but we know our replacement heifers will be with us longer than most of the bulls used. Our yearling heifers are bred for 60 days. The heifers that conceive the first 30 days are kept as replacements; those conceiving the second 30 days are sold as bred heifers. In order to continue in the herd, replacement heifers must calve each year on time and produce good calves every year. First calf heifers make up approximately 25% of the cow herd. The early pregnancy qualified them the first year, good calves keep them eligible at weaning. The rate of culling in the two year old cows with their first calf at weaning has gone down in recent years from 25% to 30% to only 15% at weaning. We are very pleased with our youngest cows.

The bulls in our program have it much tougher. Only the top 1% to 3% are ever used in our herd. Each year the top bulls in the herd are challenged by the top yearlings and best A.I. bulls available. Based on the progeny test, over half of this year's herd bulls will be culled. Only the very best stay for next breeding season; and then, to be challenged again by bright new prospects.

Yearling bulls are used wherever a bull is needed! We have found yearling bulls to be as effective in producing early calves as bulls of any other age. And, much better than bulls 4 and 5 years old in producing high conception rates early in the breeding season.

Over thirty years ago, Charlie Redd put out a little booklet entitled: "THE CASE FOR THE YEARLING BULL". The big question in 1951: Is it profitable and beneficial to use yearling bulls in the range herd? A review of the experience and research to that date showed quite conclusively that yearling bulls could and should be used.

A review of the facts today not only agrees with the 1951 conclusions but, gives substantial additional reasons to use yearling bulls.

A REVIEW OF THE FACTS:

A- Miles City - under individual breeding pastures with cows of various size and ages, yearling bulls produce as high a calf crop as did older bulls, 2,3,4,5,6 year olds. As high as 35 cows were bred to one yearling bulls.

B- Redd Ranches - for over 30 years yearling bulls have been used wherever a bull was needed. Whether on yearling heifers or mature crossbred or straight bred cows, yearling bulls have continually produce as well or better than older bulls. The average rate of pregnancy since 1965 is 95%. Yearling bulls have helped produce more calves early in the season.

C-Buyers of over 4000 yearling bulls have had good results using yearling bulls from Redd Ranches

D-Fort Collins, 1977,Coloradao State University conducted a survey of buyers of yearling bulls purchased from San Juan Basin Research Station and Redd Ranches. The averages for those responding:

-herd size: 324 head of cows
-breeding season: May 12 thru August
-length of breeding season: 111 days
-number of cows/bull: 23 per yearling
29 per older bull
-% calves born: 94%
-% yearling bulls used: 20% to 25%
-price paid: $962.00 per bull

As interesting as those figures are, it was the reasons given for buying yearling bulls that impressed the professors of Animal Science. Below are listed the five top reasons given:

1- More rapid herd improvement. The professors knew of the research that shows 2 additional pounds per calf per year where yearling bulls are used versus using bulls 2,3,4,5 years of age. They were surprised by the awareness of these "cowboys".

2-Performance selection of bulls. The increased emphasis on performance testing and the utilization of records. The performance message was being put to use.

3- Increased availability of yearling bulls. With the coming of the age of Feedlot beef, both the need for and, the numbers of performance tested bulls has grown. Most bulls are first available as yearlings. Over 70,000 bulls are performance tested each year in the USA.

4- Mating to yearling heifers.

5- Lower purchase and maintenance costs.

E- Dr. Robert E. Taylor's examination of the facts in 1977 brought these recommendations:

1- Straight bred bulls need to be 13 months of age before he can be expected to produce good quality semen.

2- "Concern is expressed about the ability of yearling bulls to mount and serve a cow." In testes to determine mating capacities, yearling bulls have served as many as 35 females over a 24 hour period. Young bulls appear to serve to their capacity regardless of the number of females to which they are exposed.

3- A bulls capacity to settle cows is closely related to scrotal circumference as it relates to testicle weight.

4- Because of variation in range conditions and management and capacities of bulls, is its difficult to determine the exact number of cows a bull can handle. "Typical recommendations of 30 cows per mature bull and 20 cows per yearling are no doubt minimum numbers under most environmental situations."

5- "Yearling bulls can be used sucessfully in most any farm or ranch situation if proper management and common sense are utilized."

F- In recent years the correlations found between Scrotal Circumference and reproductive efficiency (daughters age of puberty and life time production) have been nice gifts. Using yearling bulls with good capacity, as a yearling, will not only give you more calves but more productive daughters.

WHAT CONCLUSIONS CAN BE DRAWN FROM THE FACTS:

1- Under varying range conditions yearling bulls produce as high a calf crop as older bulls

2- You get an extra year's service from your bulls when used as yearlings- 20% to 25% more calves per bull, - 20% to 25% more calves per $ invested in bulls.

3- Yearling bulls often more fertile and active than over fed two-year olds.

4- Yearling bulls Improve production - more weight per calf.

5- Genetically, the yearling bull could be 5 years ahead of the old bull he replaces.

6-Yearling bulls are a safer buy. He has had no time cover his faults or his mother's. He has done well on his mother, gained well on test, developed testical capacity early, stayed healthy, and he is more likely to be "clean" of disease,

7- The best bulls are sold as yearlings!
Even where bulls are sold as 2's, the best bulls are sold as yearlings. If you buy two-year old bulls you are buying second best. Most any bull can make it as a two year old; the best are ready and sold as yearlings.

8- Keeping old bulls beyond five years may even reduce your calf crop! The Old bull rules the roost; he often prevents a young bull from breeding the cow but, fail to settle the cow himself

9- Yearlings cost less. The Registered bull producer can raise a bull to a year of age for much less than to two years.

10- ALL OF THE ABOVE! Total productivity of the cow herd is improved by the selection and use of good yearling bulls.

RECOMMENDATIONS:

A- Use Yearling Bulls.
Try it you will like the:

1- improved conception
2- increased production efficiency
3- greater number of calves per bull
4- better bulls sold as yearlings
5- lower cost per calf

B- Find bulls that are ready as Yearlings.
Look for:

1- sound feet and legs
2- fertility with capacity - scrotal circumferences of 30 cm plus
3- active and aggressive
4- well grown but not fat - 900 LBS. at 13 - 14 months

C- How to manage Yearling bulls.

1- Put them to work early in your breeding season.
2- Fertility test all bulls used just prior to putting them to work.
3- Visit him at work, make sure he is doing he job.
4- Limit the breeding season to 60 to 90 days.
5- Take good care of him after breeding - keep him growing and in moderate flesh.
6- All of the above. Manage yearling bulls as you would manage all your bulls with the exception of feed and care the winter following his "Rookie" season.

In this battle to improve efficiency and save the farm, there are few easy improvements. Using yearling bulls is one of easiest rocks to lift and look under. Few management tools or ideas yield so many benefits with so few problems. The correlations between using yearling bulls and total herd productivity and efficiency are great gifts. Make good use of these gifts.

PART I INTRODUCTION

"Good fences make good neighbours."[1]. Fences provide protection for crops, control over breeding, protection of livestock, and are a good pasture management tool.

Fence design and development have not changed since barbed wire was patented in 1874 in the United States. A new type of fencing called "high-tensile smooth wire fencing" is presently gaining popularity. High-tensile smooth wire fencing has been in use in New Zealand and Australia for more than two decades and is presently being used in North America.

This fencing system makes use of multiple strands of smooth, 12.5 gauge, high-tensile galvanized steel wire. Each strand, when strung and stretched to the recommended 1.10 - 1.30 kN (250 -300 lb) of tension, withstands up to 6.70 kN (1500 lb) of livestock pressure and low temperature contraction without breaking.

High-tensile wire fences are versatile; they can be used in practically any fencing situation. By modifying the number and the space between strands, the fence can be used to contain horses, sheep, cattle and hogs. Special designs are used to provide protection from predators and wildlife.

Ideally a fence should have a low capital cost, be easy to install, have a long lifespan and be stockproof. High-tensile smooth wire fencing is such a system. The advantages of this type of fencing over conventional barbed wire fencing are:

1. **Cost:** High-tensile smooth wire is about half the cost of barbed wire per unit of length.

2. **Elasticity:** There are no barbs to catch on posts or staples, so the wire behaves elastically along its complete length. Impact at one point is redistributed to the brace assemblies at either end.

3. **Ease Of Handling:** The absence of barbs makes the wire easier to handle and effectively reduces construction costs.

4. **Safety:** Smooth wire has no barbs, reducing injury to livestock, particularly horses.

5. **Stretching:** High-tensile wire is prestretched and requires no additional stretching.

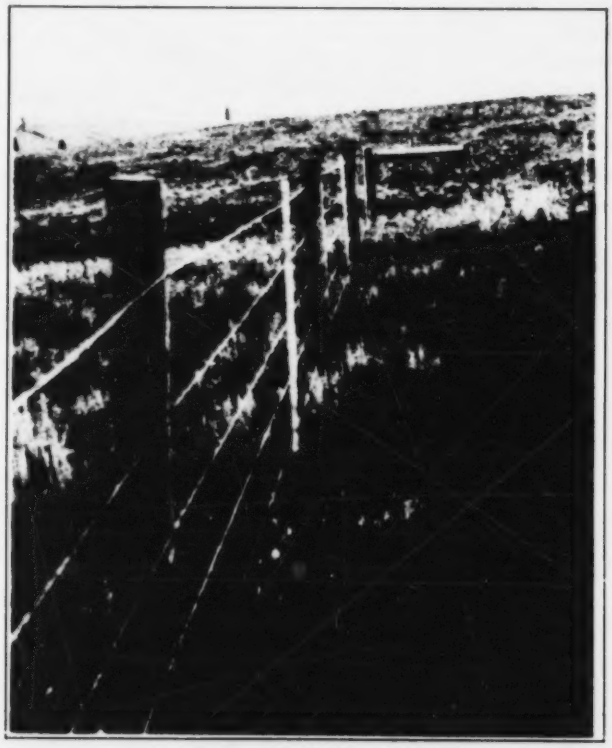


Figure 1. Typical range application of high-tensile smooth wire fencing.

6. **Repairs and Maintenance:** The wire's high elasticity and high breaking loads make it a more durable fence requiring less repair and maintenance, particularly in areas of heavy snow load or stock pressure. High-tensile smooth wire should have Type III galvanizing, which means a longer wire life. (Type III galvanizing is a thicker coat of galvanizing material than is found on standard wire.)

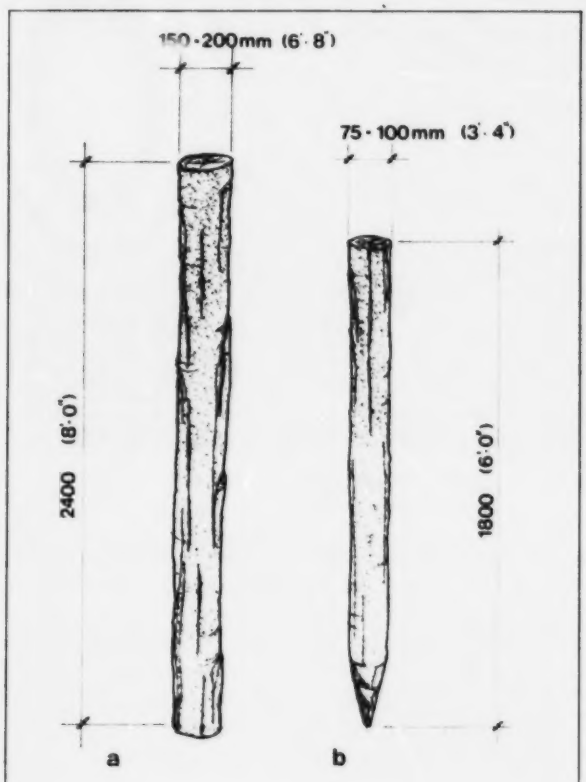
However, special tools, materials and techniques are needed to properly construct high-tensile smooth wire fences.

[1] *Robert Frost, MENDING WALL, 1914*

PART II MATERIALS

■ Posts

Wood is a suitable material for fence posts and braces. The life expectancy of high-tensile smooth wire fencing constructed with pressure treated posts and braces is over 30 years. Round wood posts are used so there are no sharp corners to kink wires or to injure livestock. Posts 150-200 mm (6-8 in.) in diameter are used to provide strength at ends, corners, braces and gates.



a) 150 - 200 mm post for end brace assemblies
b) picket used to support and space wires

Figure 2. Pressure treated fence posts

■ Wire

Wire used for high-tensile smooth wire fences is commonly 12.5 gauge high-tensile smooth wire, though other gauges are available from several manufacturers.

■ Fasteners and Hardware

Staples: Use 50 mm (2.0 in.) long staples, with slash cut points. The staples are not driven all the way home in the posts, so that the wire can slide through them.

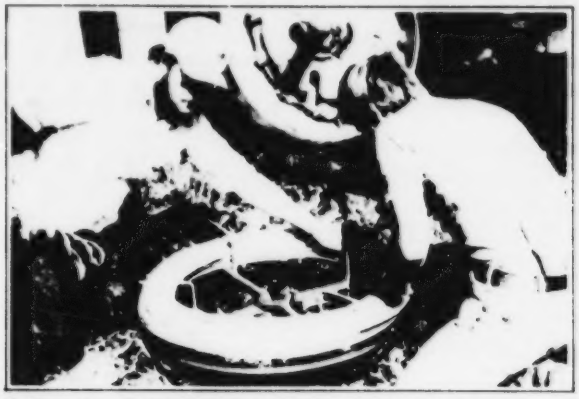


Figure 3. Coil of high-tensile smooth wire on a spinning jenny.

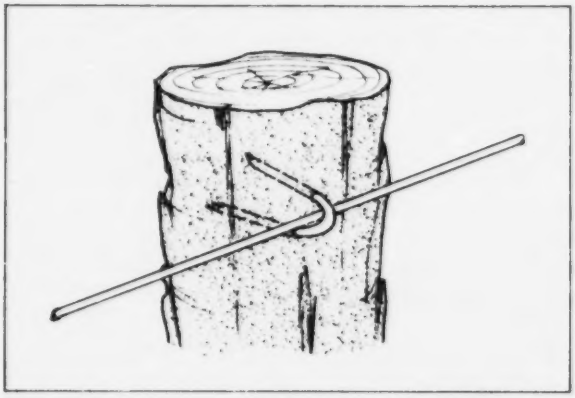


Figure 4. Staple. Note the space so that the wire can slide through the staple.

Metal dowels: Dowels should be used for constructing end, corner, gate and in line brace assemblies. Either 10M rebar or 10 mm steel rods, cut to length, can be used. For maximum dowel life, dowels should be galvanized. One 225 mm (9 in.) long and one 100 mm (4 in.) long will be needed for each single-span brace. Braces using dowels will be stronger than braces constructed using spikes.

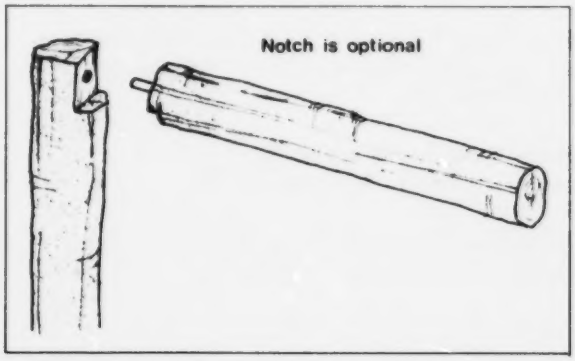


Figure 5. Dowels used to attach brace to post.

Tying off at end posts: Individual high-tensile wires can be fastened to all braces by tying off the wire with an end-post knot. This knot has only 60% of the strength of the wire.

or

Crimping sleeves can be used in tying off the wire at the end posts. Four sleeves are as strong as the wire, and are the recommended method for tying off wires.

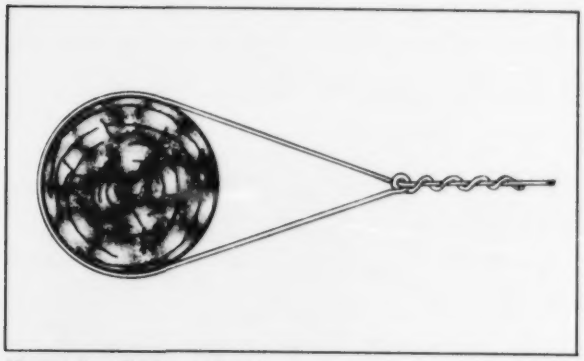


Figure 6. End post knot.

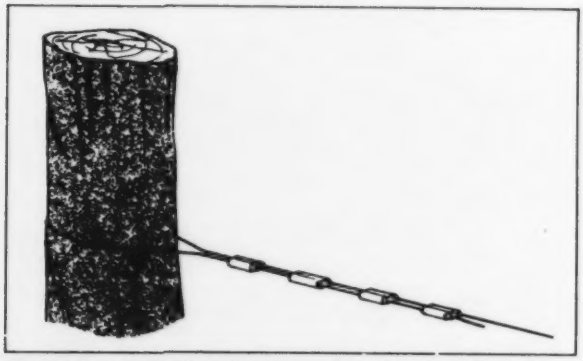


Figure 7. Crimping sleeves used to tie wire off at the end post.

In-line wire splices: A figure-eight knot can be used to tie two ends of high-tensile wire. These knots have only 75% of the strength of the wire. Crimping sleeves can be used as in-line wire splicers, 4 sleeves are required for each splice. Crimping sleeve splices are as strong as the wire, and are the recommended splicing method.

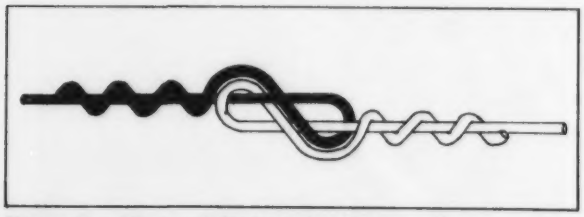


Figure 8. Figure eight-knot for in-line splice.

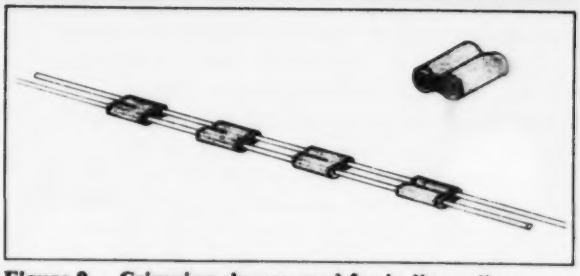


Figure 9. Crimping sleeves used for in-line splice.

In-line tension adjuster: One in-line tension adjusting device is required for each length of wire. One readily available model requires cutting the wire and uses a removable handle to wind the wire onto an automatic locking, non-slip spool. Another model is also available which does not require cutting the wire. The cost of an in-line tension adjuster is nominal.

Figure 10a. In-line tension adjuster which requires cutting the wire

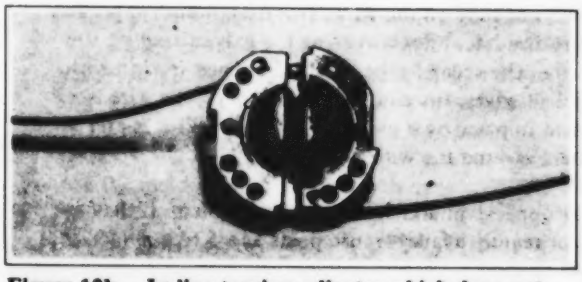


Figure 10b. In-line tension adjuster which does not require cutting the wire.

Grounding the fence: Each year lightning causes the loss of livestock. Wire fences should be grounded and their electrical conductivity broken by separating each section. Fences should be grounded every 50 m (165 ft) in dry soils and 100 m (330 ft) in damp ground. Grounding is done by driving a 12 mm (0.5 in.) galvanized steel rod or pipe 2 m (6.6 ft) into clay or clay loam, and at least 3 m (10 ft) in sand or gravel. Fence wires are then grounded to the ground rod. In addition to grounding the fence, its electrical conductivity should be broken every 500 m (1650 ft). This is done by tying the wire off at the posts.

If the fence has to be built in the close proximity of high voltage power lines special precautions need to be taken. Contact the transmission department of the utility company for special grounding instructions.

- **Droppers (stays):** One of the principal functions of a post is to maintain wire separation or spacing. This may be done at a lower cost by installing droppers which are not driven into the ground. When using droppers, spaced at 3 m (10 ft), line post spacing can be extended up to 20 m (66 ft), depending on the terrain and the kind of livestock. This significantly reduces material costs.

  Conventional dropper designs tend to slide on smooth wire. Special dropper designs are used to prevent sliding. The wire is crimped as it crosses the dropper surface; this prevents the dropper sliding. Droppers can be made of wood or metal.

  Wood droppers: Treated 2 x 2's with angle-cut grooves for wires are commonly used. Hardwood is preferred over softer woods. It is best to cut alternate grooves on opposing sides of the dropper so it can not slide on the wire. Alternatively, wood droppers can be stapled to the wire, though dropper sliding may be experienced.

  Metal droppers: Two types of metal droppers have been developed. One is U-shaped with notches cut so the wire angles across the dropper, and the dropper will not slide on the wire. This design of dropper has the disadvantage of wearing the galvanizing off the wire. The second type uses a U shaped section with rolled edges. Instead of using notches, the wire is held in place by a pin inserted through holes and bent around the wire.

  Dropper availability could be a problem. If they are not readily available, use posts at a 5 to 6 m (15 - 20 ft) spacing.

Figure 11. Wood dropper on high-tensile smooth wire fence.

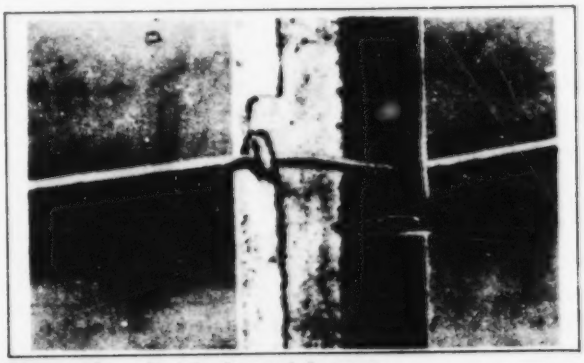


Figure 12a. Notched metal dropper.

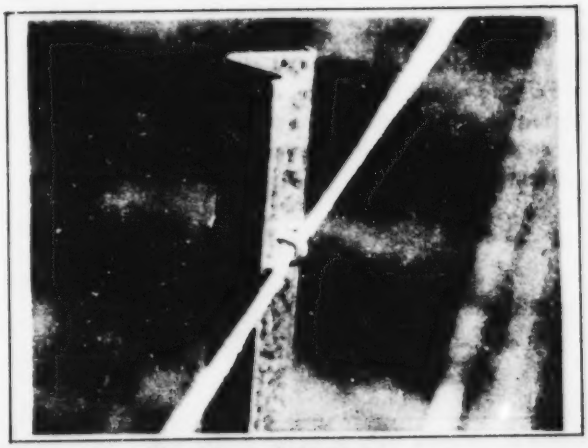


Figure 12b. Pinned metal dropper.

Tools

Like any other fencing, high-tensile wire fencing requires an assortment of tools such as hammer, fencing pliers, post driver, saw, brace and bit, etc. A crimping tool is used for in-line wire splices or fastening to endposts. A tension tester is used to measure the tension in each wire.

A "spinning jenny" is also useful for unrolling wire without entanglement. Uniform play out is important to prevent kinks which weaken the wire.

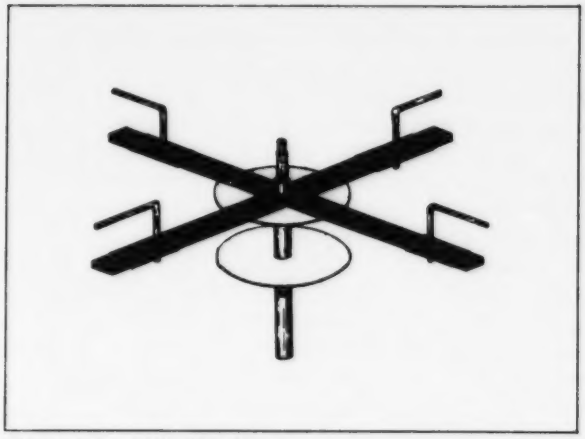


Figure 13. Spinning Jenny.

Note: High-tensile wire is stiff and has a tendency to recoil when it is cut. When cutting high-tensile wire, hold the needed end in one hand and the unneeded end down with one foot. If it is necessary to let go of the cut end, weight it down with a tool, or simply push the end several centimetres (inches) into the soil.

PART III CONSTRUCTION

The lifespan of a high-tensile smooth wire fence is expected to be 30 years or longer. To ensure that the fence lasts this long it must be constructed of quality materials with top workmanship. Also, the location of the fence should be chosen so that it will fit your long term management plan. It is uneconomical to move a fence with a 30-year life after only 5 to 10 years of use.

■ Laying Out the Fenceline

Once the general location of the fence has been decided, walk or ride it. Pick your fence location (if possible) to avoid hazards such as steep sidehills or sloughs, and avoid corners as much as possible. By minimizing these hazards a strong fence that is easy to maintain can be constructed.

■ Posts and Guide Wire

The first step in fence construction is to place end, corner and gate posts. These posts serve as anchor points for stringing guide wires, and also act as part of the brace assemblies. The posts should be 150 - 200 mm x 2400 mm (6 - 8 in. x 8 ft) and set 1.25 m (50 in.) deep. Line posts are 75 - 100 mm x 1800 mm (3 - 4 in. x 6 ft) and driven 600 to 700 mm (24 in. to 26 in.) into the ground.

To set end, corner and gate posts, a smaller diameter pilot hole is augered to 900 mm (3 ft). The holes serves as a guide for pounding the post. It is augered at a slight incline so that when the post is set it will lean opposite to the pull of the wires. (top of post is about 5 mm (2 in.) off the vertical).

After all end, corner and gate posts are in place, two guide wires are strung. One is the top wire of the fence, the other the bottom wire. These wires are used to accurately place line posts on the fenceline and to maintain vertical alignment of the posts.

Once the wires have been fastened to the posts (by knots or crimping sleeves) place in-line tensioners and adjust the tension in the wires to about 0.44 kN (100 lb). Now check to see that the wires are straight. On uneven terrain, drive line posts on hilltops and at the bottom of dips to keep the wires straight and true.

■ End Brace Assembly

Two types of brace assembly are used: single and double span. A span length of 2400 mm (8 ft) is used for each span in a double brace but a minimum span of 3000 mm (10 ft) is preferred for a single brace. Under most fencing conditions a single span brace is preferred. Research at Kamloops has shown single braces to be as strong as most double braces. Braces are spaced as far apart as the terrain will allow, to a maximum of 500 m (1650 ft).

A double brace assembly should be used under poor soil conditions or if more than 6 wires are used. The two boxes making up the double brace must be perfectly in line with each other, as well as being in-line with the fence. If they are not lined up, the strength is less than that of a single brace.

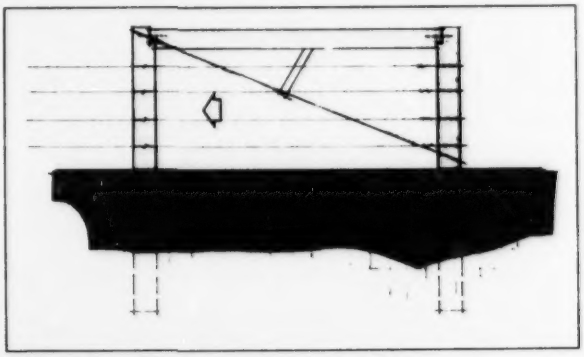


Figure 14. Single span brace assembly.

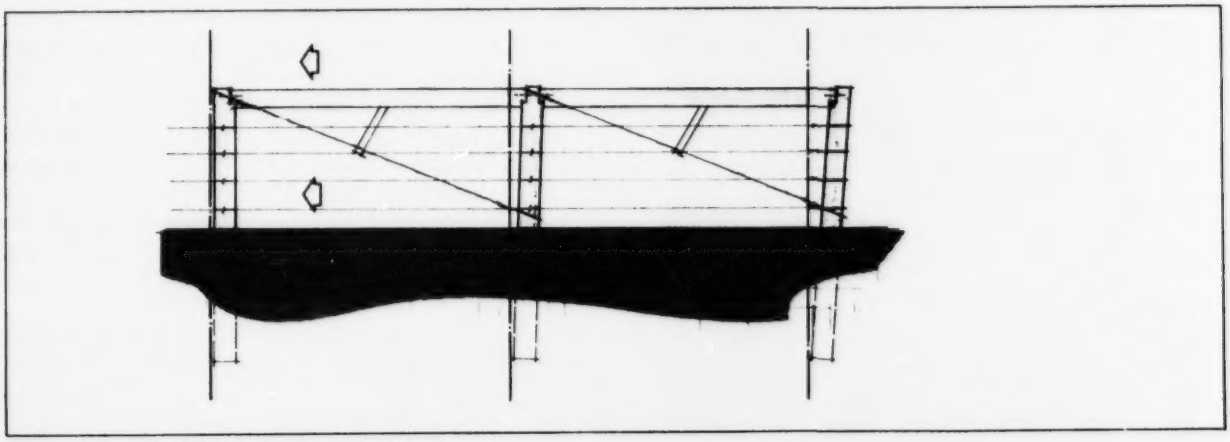


Figure 15. Double span brace assembly.

The horizontal brace for both a single and double span-type is pegged into place using 10 mm (⅜ in.) rods. The rods are driven through a hole in the side of the post 75 - 100 mm (3 - 4 in.) from the top and into a hole drilled in the end of the horizontal brace. The holes should be slightly smaller in diameter than the rod. Shallow notching of the post to accept the horizontal brace can also be used. Leave 25 to 50 mm (1 to 2 in.) of the pin exposed to hold the brace wires in place.

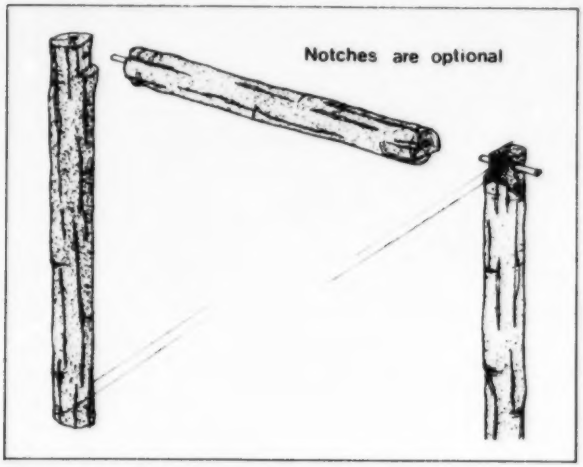


Figure 16. Notched and pinned brace.

Once the posts and horizontal brace are in position, the brace wire can be attached. Drive a staple half way into the post, 100 mm (4 in.) from the ground at the back of the end post. Two wraps of wire are placed under the staple on the end post and over the pin stub on the other brace post and tied off. A pressure-treated twitch stake is used to adjust tension in the wires. It is locked behind the horizontal brace so that it will not unwind. Or the tension can be adjusted in the brace wires with a temporary smooth wire tension adjuster, then crimped. Figure 17 demonstrates the construction of an end brace.

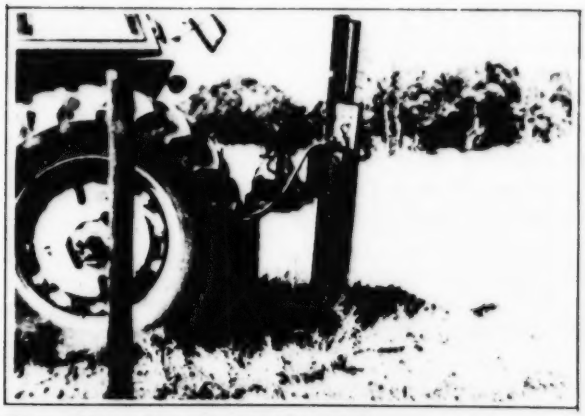


Figure 17a. Brace posts after driving.

Figure 17b. Drilling the holes for the pin.

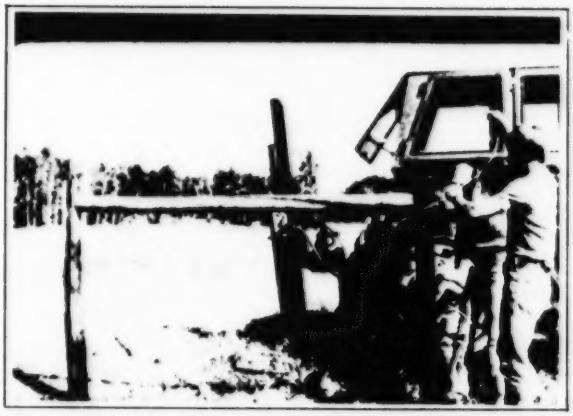


Figure 17c. Wrapping the base wire.

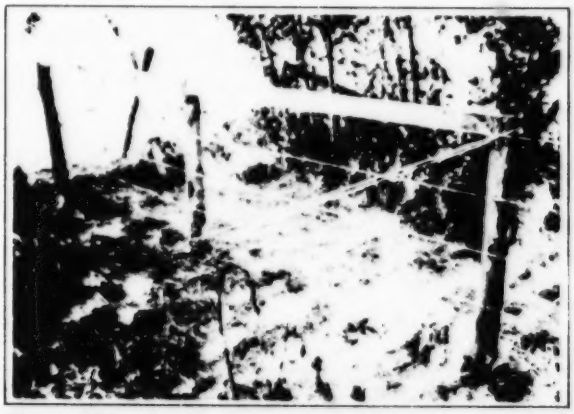


Figure 17d. Finished brace assembly.

■ **In-Line Brace**

A single span end brace assembly should be used for all in-line braces. A second brace wire forms an X with the first wire. Fence wires must continue to the far side of the brace assembly so that the forces are distributed across the brace.

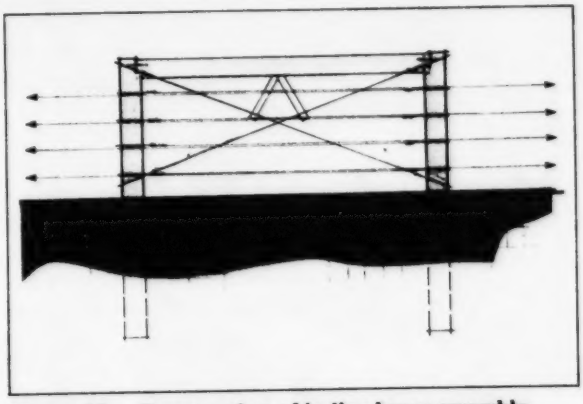


Figure 18. Construction of in-line brace assembly.

■ **Corner Assemblies**

Keep the number of angles in the fence to a minimum. Figure 19a shows a good corner brace. However, it is possible to fence around gentle curves without constructing corner brace assemblies, as shown in Figure 19b.

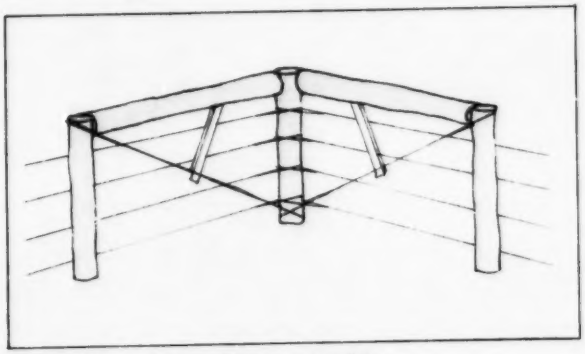


Figure 19a. Corner brace assembly.

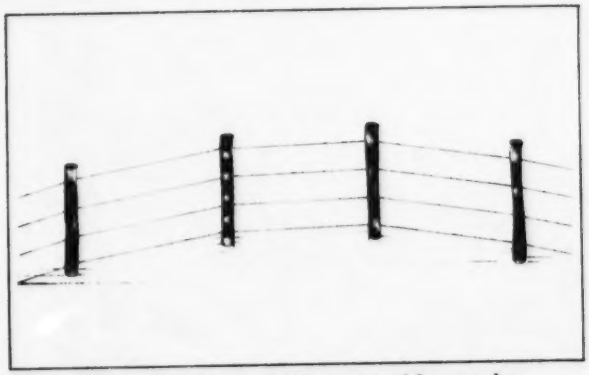


Figure 19b. Fencing a gentle curve without using corner brace assembly

■ **Bracing On A Changing Slope**

A double in-line brace assembly should be constructed where there is a major change in slope. The centre post of the assembly is located at the break in the slope. Each half of the assembly is then constructed on its respective slope. Wires from both directions are tied off at the centre post of the brace assembly.

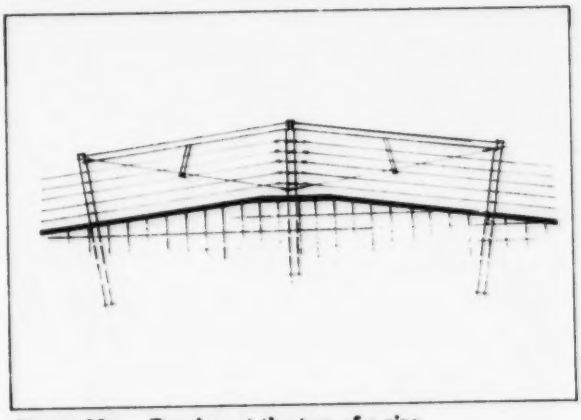


Figure 20a. Bracing at the top of a rise.

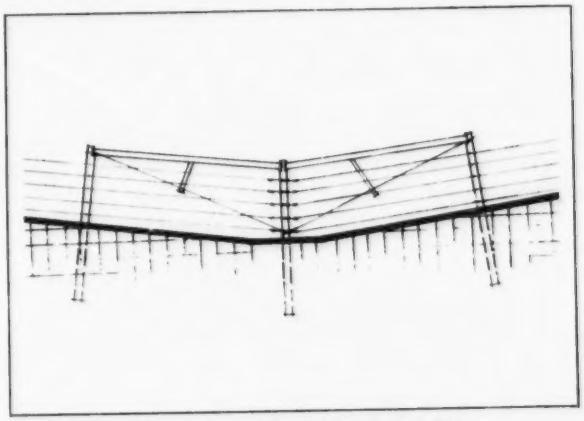


Figure 20b. Bracing at the bottom of a dip.

■ **Driving the Line Posts**

The two guide wires are used to set the posts straight and vertical.

When fencing up and down slopes, posts should be driven perpendicular to the surface of the ground. Not following this procedure will reduce the height of the fence. Note, in Figure 21b that post placement is perpendicular to the ground surface.

Wire should be located between the posts and the greatest livestock pressure. On sloping terrain, the wire is on the uphill side of the post.

Line posts are usually spaced 5 to 6 m (15 to 20 ft). By using one or more droppers, post spacing may be up to 20 m (66 ft).

■ **Fencing Through Dips or Gullies**

For small dips or gullies take the main fence straight across; posts are driven in the dip. Extra wire is used to form a V between the main line posts and the posts in the dip.

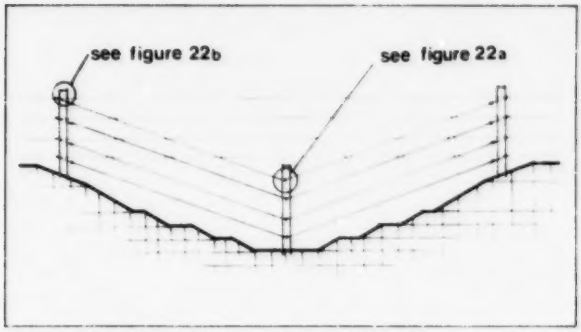


Figure 21a. Fencing across a small gully.

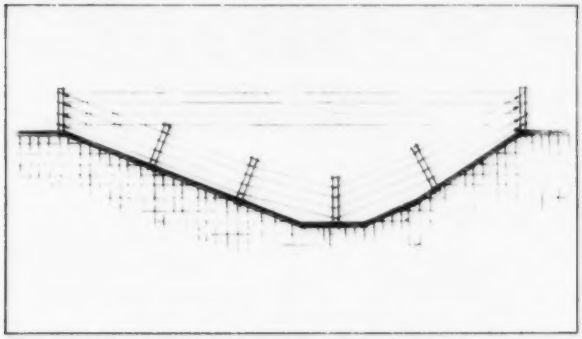


Figure 21b. Fencing through a larger gully.

■ **Wire Spacing**

The number of wires and the spacing between the wires will depend on the kind of livestock. Normally you can replace standard barbed wire strand for strand—areas now using 4-strand barbed wire can use 4-strand high-tensile smooth wire.

Table 1 gives application and wire spacings for high-tensile smooth wire fences.

■ **Stapling**

Before stapling, adjust tension in each wire to 0.44 kN (100 lb) tension. This is to prevent the wires crossing and being stapled at wrong levels on the posts.

Staples should never be driven all the way "home" into the post. Doing so results in a less effective fence; the resistance from the staples does not allow the wire to behave elastically along its full length. It can also kink the wire, making it weaker.

Use 50 mm (2 in.) or longer staples because 45 mm (1 ¾ in.) staples are too short to allow proper wire clearance. Always rotate the staple so that the slash cut forces the legs to spread in the post, increasing holding power.

To counteract the pull of the wire in dips and on hills, drive staples at an upward angle into dip posts and at a downward angle into hill posts. On very steep rises or dips, driving two staples in either of the ways shown in Figure 22 helps to hold the wires against the posts and is a good insurance against pullout.

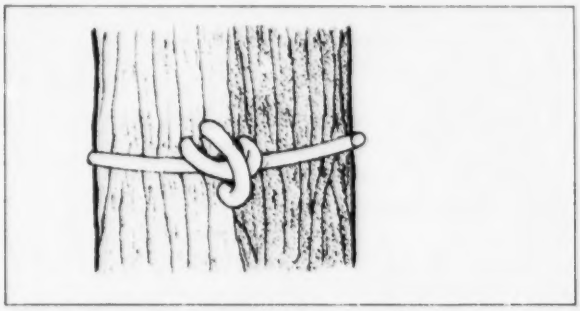


Figure 22a. Staple installation on a dip post.

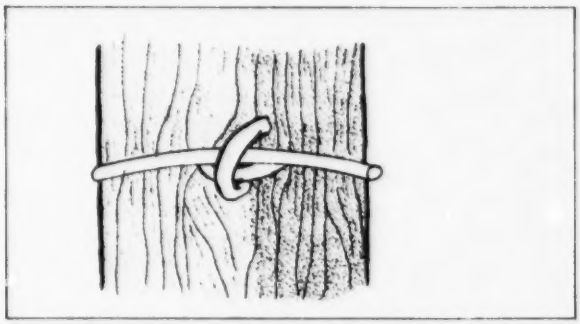


Figure 22b. Staple installation on a rise post.

Friction between the wire and the posts on gentle curves can be reduced by placing staples between the wire and the posts. This can be accomplished by stapling as shown in Figure 23.

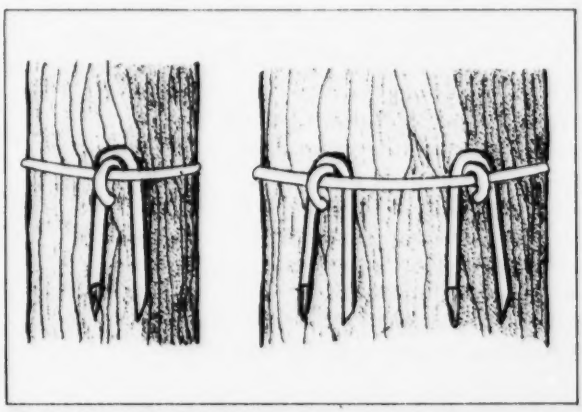


Figure 23. Staple placement to support wire around end or corner posts.

TABLE 1. HIGH-TENSILE SMOOTH WIRE FENCE APPLICATIONS AND WIRE SPACINGS

NUMBER OF STRANDS	APPLICATION	HEIGHT FROM GROUND mm (inches)	WIRE SPACING (from ground up) mm (inches)
4	Replaces 3 and 4	1010 (40)	380 (15), 200 (8), 200 (8), 230 (9)
4	(pasture and range fencing	1160 (46)	380 (15), 250 (10), 250 (10), 280 (11)
5	Designed for moderate to heavy grazing by large animals (horses, etc.) and for longer post spacing [12 m or more (40 feet or more)]	1140 (45)	400 (16), 180 (7), 180 (7), 180 (7), 200 (8)
6		1160 (46)	330 (13), 150 (6), 150 (6), 150 (6), 180 (7), 200 (8)
8	Contains small and large animals discourages some wildlife and dogs, and longer post spacings	1170 (46)	100 (4), 130 (5), 130 (5), 130 (5), 150 (6), 150 (6), 180 (7), 200 (8)
*10	Replaces woven wire, will contain most kinds of livestock, turns away dogs and wildlife; discourages predators if 2nd, 4th and top wires are electrified	1180 (46)	100 (4), 100 (4), 100 (4), 100 (4), 130 (5), 130 (5), 130 (5), 130 (5), 130 (5), 130 (5)
10	feedlot fence	1330 (52)	250 (10), 100 (4), 100 (4), 100 (4), 130 (5), 130 (5), 130 (5), 130 (5), 130 (5), 130 (5)
12	horse fencing	1460 (57)	100 (4), 100 (4), 100 (4), 100 (4), 130 (5), 130 (5), 130 (5), 130 (5), 130 (5), 130 (5), 130 (5), 150 (6)

**Note:* posts are drilled for this wire, or staggered on alternate sides of this wire.

■ **Placing the In-Line Tension Adjuster**

In-line tension adjusters should be installed at the mid-point between braces. This makes it easier to adjust the tension in the fence. However, the tensioner should not be installed immediately next to changes in slope, nor between any two posts within a corner or a curve. On fences less than 200 m (660 ft) long tensioners can be installed at either end of the fence, or near a gate for easy accessibility.

As a general guide use one in-line wire tension adjuster per strand for every 500 m (1650 ft). If the terrain is very rough this distance will be reduced. Fences which contain several corners or curves or rises and dips may require two or more tension adjusters per wire.

Wire tension should be adjusted in stages of 0.44 kN (100 lb) to a maximum tension of 1.10 - 1.3 kN (250 - 300 lb). Work from the top wire downwards for easier separation of the wires and to provide clearance for turning the handle. The in-line tension adjuster also permits seasonal adjustment of wire tension to compensate for temperature change. During the winter, tension on the wires should be reduced or a spring assembly should be used. A spring assembly is shown in Figure 24.

TABLE 2. WIRE TENSIONS FOR SEVERAL TEMPERATURES

Temperatures	Tension
-10°C	1.55 kN (350 lb)
0°C	1.33 kN (300 lb)
10°C	1.22 kN (275 lb)
20°C	1.11 kN (250 lb)

It is possible to measure the approximate tension on any particular stand anywhere on the fenceline by means of a simple device which you can make at low cost. Figure 25 shows a homemade wire tension tester. Take a piece of wood 1100 mm (42 in.) long and place nails 1016 mm (40 in.) apart. Use a spring scale that will measure up to 10 kg (22 lb), and pull the wire with the spring scale to deflect the wire 12.7 mm (0.5 in.). Read the scale and multiply the scale reading to obtain the tension. If reading in pounds, multiply by 20 for pounds of wire tension, or by 0.09 to get kN of wire tension. If the reading is in kg, multiply by 0.20 to get kN of wire tension.

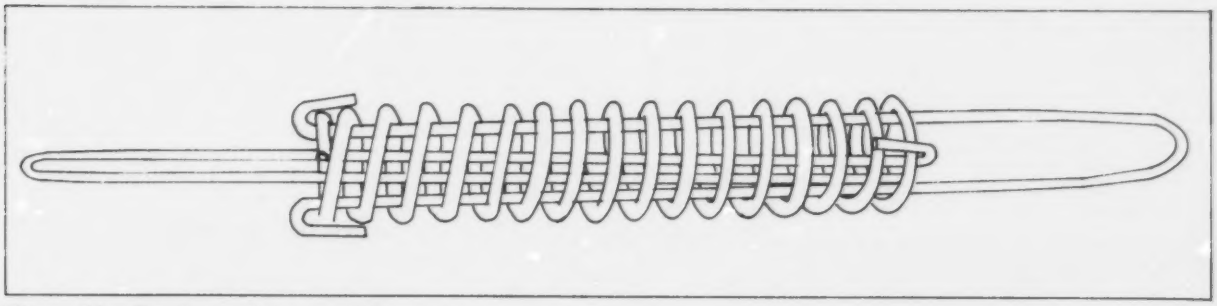


Figure 24. Tension spring assembly

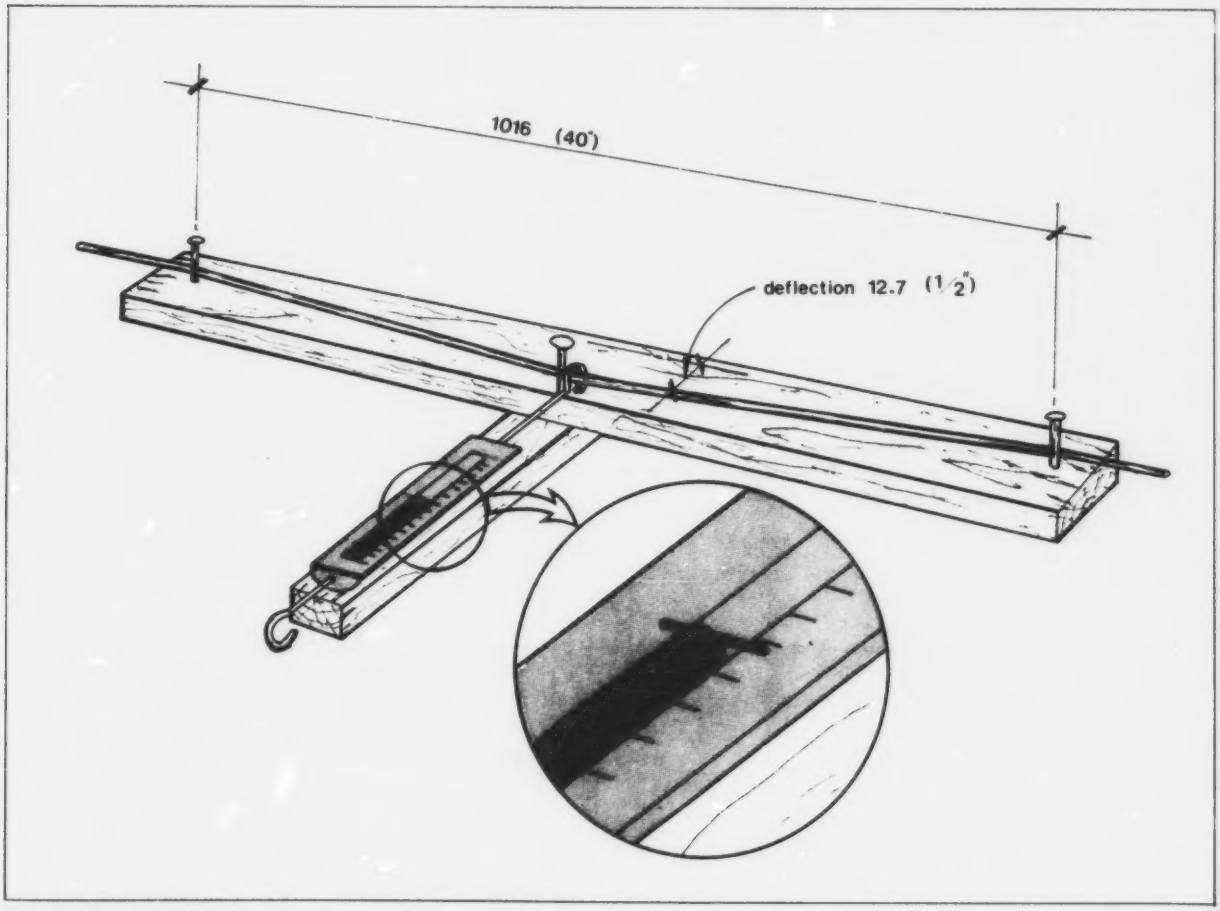


Figure 25. Wire tension meter.

Gate Types and Location

When locating and installing livestock and machinery gates in high-tensile smooth wire fences, use the same considerations that apply to gates in other types of fences. Such gates should be (1) located for maximum convenience and efficiency in farm management, (2) at least as high as the fence, (3) wide enough to permit passage of the widest piece of machinery, (4) level enough and hinged on the proper side to swing freely, and (5) durable enough to last as long as the fence.

There are a variety of styles and sizes of prefabricated gates available and they are usually excellent for use in high-tensile smooth wire fences. Gates can also be fabricated on site at a lower cost with pressure-treated lumber or steel pipe with wires as shown in Figure 27. For gates that you frequently drive through, a "Texas gate" (cattle guard) can also be installed. Basically a "Texas gate" (cattle guard) is made by spacing a pipe grate over a dip in such manner that the livestock can not walk over it but cars and farm machinery can. CPS Plan M8362 shows the details of a "Texas gate", and is available from Alberta Agriculture.

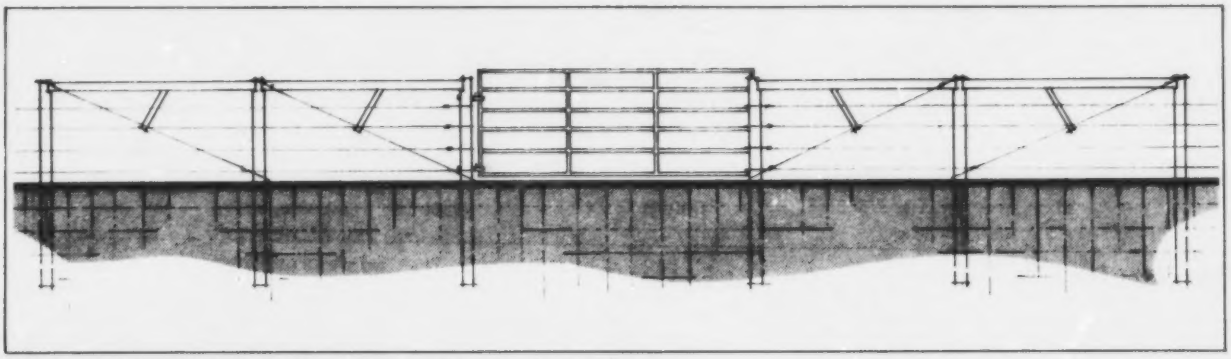


Figure 26. Conventional gate in high-tensile smooth wire fence.

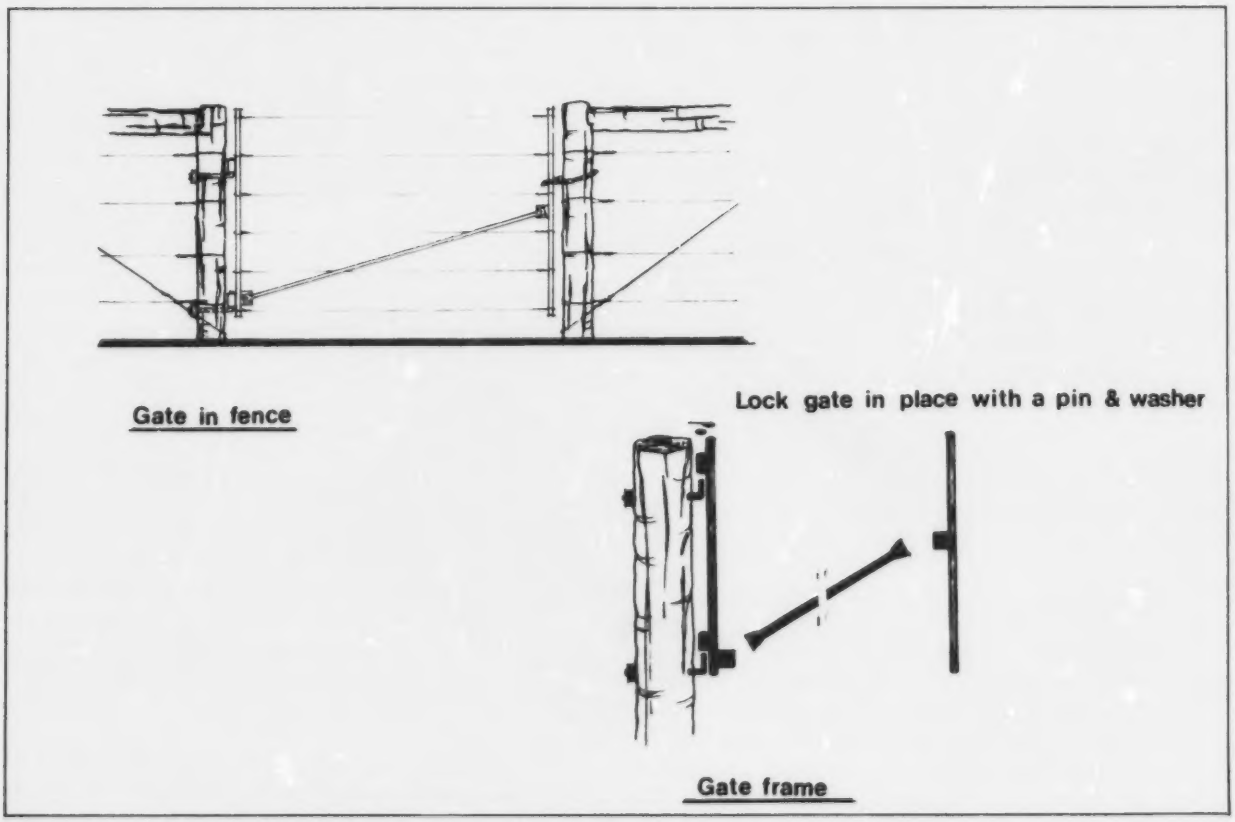


Figure 27. Light weight gate in high-tensile smooth wire fence.

In boundary fences near busy roadways, it may be necessary to set gates back from the fenceline to permit pulling long farm implements off the roadway. In such instances, it is more practical to build a plank fence on the sides of the offset than to erect two short sections of high-tensile wire fence.

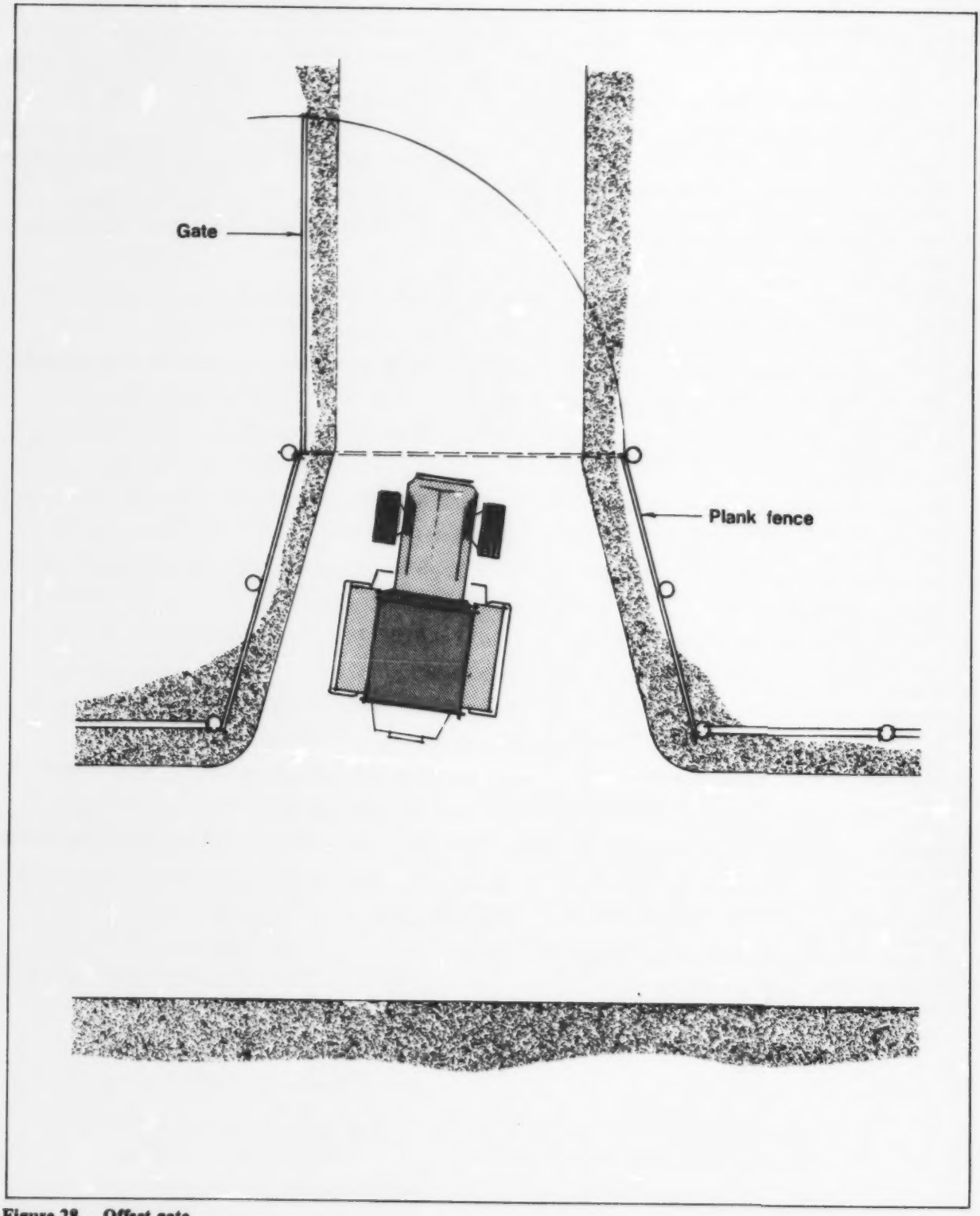


Figure 28. Offset gate.

PART IV SAFE FENCING PRACTICES

Anyone building a wire fence is subject to cuts and scratches from the wire. Chance of injury will be reduced by observing the following safety precautions:

- Wear tightly woven, tough clothing that will not catch on the ends of the wire.
- Wear heavy-duty, gauntlet-type leather gloves which fit snugly.
- Wear long pants and high work shoes with heavy soles to protect the feet and legs.
- Have the right tool for each job, keep it in good condition and use it only according to manufacturer's directions.
- Wear safety goggles or eye shields when cutting the wire or adjusting the tension of the wire, as well as when driving nails or staples.
- Never carry nails or staples in pants pockets. Use a nail apron or tool bag.
- Use driving caps on posts as recommended by the post driver manufacturer.
- Keep children and livestock away from all fencing operations.
- When handling, driving, drilling, nailing or stapling chemically treated wood posts or lumber, wear face shields and rubber gloves, and cover otherwise unprotected areas of your skin. Some people are allergic to wood-preserving chemicals.
- Never use unsafe shortcuts, or eliminate such items as safety wires on twitch sticks.
- Pick up all cut ends of wire, dropped staples and nails, etc., so they will not cause injury to humans, be eaten by grazing livestock,damage mower blades, or snarl equipment.
- Don't work at fencing during electrical storms.
- Properly ground the fence as soon as it is erected.
- Remember, wire is an excellent conductor. Be careful when stringing the guide wire or line wires that they do not come in contact with any powerlines overhead or at ground level where you are working.
- Be cautious when driving posts in the vicinity of buried gaslines, electrical lines or other utilities (most utilities will locate and mark buried services).

PART V SUMMARY

High-tensile smooth wire fencing has proven to be a less expensive alternative to traditional fencing methods. Quality materials and good workmanship produce a strong, long-lasting fence. The absence of barbs produces a fence that does not damage livestock hides or injure humans.

APPENDIX I: Construction Procedure

STEP 1: Walk or ride potential fence route. Choose fence location to avoid or minimize steep sidehills, sloughs and corners.

STEP 2: Clear fenceline, levelling as many dips and hills as possible.

STEP 3: Place end posts for all brace assemblies on fenceline.

STEP 4: String top and bottom wires to act as guide wires.

STEP 5: Insert in-line wire tension devices and adjust wires until taut.

STEP 6: Using guide wires to ensure straightness, construct all brace assemblies.

STEP 7: Adjust the tension of the guide wire to 0.44 kN (100 lb).

STEP 8: Use guide wires to drive line posts to ensure they are vertical and in line.

STEP 9: Staple wire to line posts and braces.

STEP 10: Working from the top wire down, adjust wire tension to 1.11 kN (250 lb) in stages.

STEP 11: Ground fence.

STEP 12: Insert droppers as required.

STEP 13: After a few days return and adjust tension on wires.

(This material is taken from Alberta Agriculture publication Agdex 724-3)

CUSTOM FEEDING
by
Richard Hamilton
Ochre River

BACKGROUND:

Our operation is primarily custom feeding cattle supplemented with a 120 cow herd and some feeder purchases. Situated at Ochre River, we are near a very large cow-calf region and therefore are in a position to offer a necessary service of custom feeding as an option to nearby ranchers and farmers. We have finished our own cattle for many years but just started custom feeding in 1979. There were two main reasons for choosing to expand into custom feeding.

1) Remove risk of ownership of the cattle from myself
2) Stabilize the labor situation. Our cropping program consists mainly of corn for silage and barley for grain production (400 acres corn and 4-500 acres barley).

The feeding system used is fenceline bunk feeding with all feed being weighed into customer pens. Customer cattle are penned individually in pens ranging from 40-100 head and charges are based on feed and services as supplied. Feedlot capacity is 1500 head at one time.

WHAT TO KNOW ABOUT CUSTOM FEEDING:

Custom feeding is a specialized service which offers to a customer the opportunity to take advantage of:

1) specialized feeding equipment which allows for flexibility and accuracy in feeding.
2) good facilities which quite often cannot be justified for smaller numbers of cattle
3) feeding cattle at busy times of the year i.e. calving - seeding - harvesting.
4) experience in formulating rations, maintaining health control and providing marketing expertise.

Feedlots and customers need to be able to change and adapt to different situations.

For example

- Prices of feedstuffs affect what ration is fed.
- desired time of marketing determines type of feed.
- if a different type of carcass is required to meet demand, we must produce it.
- competition from other meats and changes in society attitudes may force more changes than we have seen yet.

CUSTOM FEEDING IN MANITOBA

Cattle feeding in Manitoba showed substantial losses from about 1975-1980. Traditional investors started turning away from cattle finishing and by 1979-80 were hard to find. Many feedlots both private and custom have left the business voluntarily or otherwise because of unprofitable results. Other provinces at this point recognized the reality of the cattle industry and took various steps to assist their feeders. In the years 1974-82 there were 438 million dollars paid out in grants and subsidies to cow-calf producers in B.C., Alberta, Saskatchewan, Manitoba, Ontario and Quebec and 146 million on slaughter cattle with the exception of Manitoba where the assistance on slaughter cattle was nil.

Manitoba can compete in cattle feeding if placed on equal footing with its neighbors but not under the present circumstance. One owner finishing concept is working to a degree but the incentive to finish cattle is considerably greater elsewhere than in Manitoba. The potential for an expanded feeding industry in Manitoba is tremendous when one considers the possibilities in forage and grain production coupled with the rough land available for cow-calf production.

Cow-calf producers would do well to ponder what would happen if eastern demand for calves were to be reduced substantially.

IMPORTANCE OF CATTLE FEEDING IN MANITOBA

- In the last few years we have lost annual feedlot capacity of 50,000 head which represents a lost spin off to the provincial economy of 225 million dollars.

- A stronger feeding industry in Manitoba would provide a local market for feeders.
- 50,000 head more fed in Manitoba would create a market for 2½ million bushels of feed grain.
- The raw products are all here for the manufacture of beef. Why ship them all away.

The governments speak of incentives to attract new industries to locate in Manitoba. The cattle feeding industry is potentially here already and should be developed.

CONSIDERATION OF CUSTOM FEEDING AND CHOOSING A FEEDLOT

As cow-calf producers you may already be finishing your own cattle. If not, here are a few of the things to consider if you are looking at custom feeding as an option.

1) Do you have adequate facilities, water supply, feed supply.
2) What equipment investment is needed for silage making and storing if this route is chosen.
3) How would you feed your cattle at home if you tried; self feeder or mixing truck and what are the ramifications of each method.
4) Are you prepared to spend the time and money to become experienced.

If you decide to have your cattle custom fed here are some things to look for in choosing a lot.

1) Overall general appearance gives a good indication of management.
2) Facilities should be adequate to provide wind shelter and good working conditions.
3) Are cattle scales available - (a must to provide performance information).
4) Feedlot stability (your banker can check for you)
5) Reputation - Ask for a few customer references.
   Honesty and integrity are imperative to a custom feedlot survival and ability to maintain business.
6) Ask to see some cost of gain records.
7) Discuss all your concerns with feedlot manager.
   Good communication eliminates problems.

A custom feedlot like any other business is there to make money for itself. Its other goal is to do the best job possible for the customer. If you decide to finish your cattle, take a close look at the option of custom feeding because it just may be the answer for your situation.

RECORD OF PERFORMANCE - What it means to my operation.

P A N E L

My name is Rodger Mawer and I farm with my wife Anne and family about 25 miles northwest of Brandon. We run a mixed farm of about 1400 acres and we keep around 100 cows and have a small feedlot. We finish all our own cattle that are not sold for breeding stock, sometimes buy feeders to finish, and are presently feeding the Manitoba Limousin Association Bull Test and the Manitoba-Saskatchewan Blonde Association Bull Test.

We started farming in 1965 with 20 grade Angus cows and bred straight Angus until 1970 when we started as a contractor with the Brandon Research Centre. We contracted with them for four years then contracted with Western Breeders for one year. The contract involved breeding A.I. our cow herd to two "exotics" per year and keeping the records for them. They bought all the male calves and up to 1/2 of the females per year. We started our own performance testing at this time and kept it up for 10 years. In 1980 we went onto the government R.O.P. program and have been on it ever since. Our herd averages have gone from 420 lbs in 1970 to 553 this year on steers and 402 lbs in 1970 to 490 this year for heifers at 200 days with an average bull weight this year of 576 lbs.

The climb to higher weaning weights has been a long slow grind for us as we started with first crosses and have been working up to a pure limousin herd. As the crosses become less dominant the increases slow down.

I have been asked to talk and answer questions on the R.O.P. program, but, anyone who knows our farm and habits knows that Anne keeps all the records now and is really the one that knows something.

I will start with the R.O.P. programs paper work. We now have the new "condensed" version and eliminate easily a third of the paper. An example or two would be filling sheets up and as far as I'm concerned they can eliminate the carbon copy as I have it all in my record book to go back to. They say no job is finished until the paper work is done but the government boys are doing too much paper work.

I shouldn't talk about my next topic as I haven't an answer yet, but I hate adjusted weights because paper can do more than grass and milk. It makes some of the later calves look good on paper but not in the feedlot. Break it down into more groups they say, but if you use 3 or 4 bulls then break it down too many times I find it confusing.

When we talk R.O.P. most of us still think from birth

to 200 days. With on the farm finishing of cattle though I find it very good to look from 200 to a year and on to finish a little closer than I have been. The weaning weights are a good indication of the cow and the 200-day to finish can be a good way to look and compare the bulls. We can also weed out any of the girls that don't seem to be able to carry the ball regardless of the bull. If you take your records up to the finished product then with the use of the Beef Commission print-outs you can add yield and grade to the list. We can then mix in some performance testing on bulls, keen use of our eyeballs, and what the banker dictates. Now we are ready to try and make sound decisions in hard times when cattle have to be treated as a business.

We start getting our pay for all the weighings and record keeping every fall after the calves are weaned. The next step is to then pregnancy check our herd. Then the job comes to cull the herd and select next year's replacements.

Our culling starts by eliminating the open cows, then we eliminate the trouble cows, i.e. bad feet, lump jaw, etc. Everything being equal we have now used up a third to one-half our replacements. Now it is time to really seriously open up the R.O.P. records and start culling. Our first culls usually come out of the records on 200 day weights. Cows that have bad 200 day weights will be cut, some of these will be average cows that have a definite slide in their weights indicating they are getting old or have some trouble somewhere. Some of these will be first calf heifers that didn't cut it against their contemporaries. After we work our way through this batch we move into our records again and look at yearling and finished and figures. Here we find a few cows that have come through the 200 day weight cut in an average position but fall behind in this yearling and finished weights. These go next. We usually end up in this area with choices and sometimes use the Beef Commission records of yield and grade on finished animals to settle things.

The next step is to try and select the replacement heifers. We do this in about three stages. We always select at least five more heifers than we need i.e. 20. We have been trying to put 15 heifers into a 100 cow herd per year. We go through our records and select the top 50% by their indexes. We then set the book down and look at what we have and eliminate anything which we really don't like. These heifers are then wintered and bred the next season. The next selection comes when they are pregnancy checked. Opens go. We then keep them to calving and some more selection goes on. Trouble heifers are eliminated either at the time or next fall depending.

Our next step is in selecting our bulls for testing and sales. We select indexes of 100 and better. After we eyeball the bulls and look over feet and legs and scrotal measurements, we go to the R.O.P. sheets and try to pick bulls off of cows that don't quit at yearling weights. This helps a lot as it somewhat helps to eliminate testing bulls that don't make the sales although as more people start to use it it gets harder but the quality of the bulls goes up.

Maybe we should be listing the areas where money can be made by these records. A poor cow costs as much to keep as a good cow therefore it is advantageous to keep only good producing cows. The records should help you to select and keep less bad heifers and stop them from getting into the herd. Records can help with bull test selections. i.e. select bulls off of cows that don't quit on these yearling weights. Records should help you select steers that will finish off well.

How many dollars each could be given I don't know, however, when cost margins are low we have to be even more careful to try and stay on the black side of the ledger.

I'm George Boucher from Binscarth, I'm retired and have four children, my eldest son Kevin farms with me. Our cow herd consists of 100 Charolais cows not Simmental, as stated in the brochure sent out by the Agricultural Extension Centre. Our cows range from percentage to purebred, we have also bred yearling heifers to calve as two-year-olds successfully for at least 15 years. Each year we A.I. approximately 40 cows and heifers starting in the middle of May and A.I. for one month. We rely heavily on the National Sire Monitoring Program data for selecting semen for our A.I. program.

We pasture these cows on approximately 400 acres of native and tame pastures, to which we apply fertilizer and we rotate the grazing fields on a regular basis.

I'll try to explain what R.O.P. means to our operation, I use R.O.P. as a selective tool to enable me to cull cows and bulls on performance of progeny select replacement heifers and select future herd sires.

For example we know our replacement program is working when our "first calf" heifers out perform our "second calf" cows by 15 lbs. average per head.

In our culling program open cows are not kept regardless what their performance is, here I might mention that after our replacement selection is made, the cull steer calves and heifers enter our feed lot and are finished at 1250 lbs. steers and 1000 lbs for the heifers. Our cull cows are also finished out. All our cows that continually have progeny of 95 index or lower will be culled, culling the bottom end from our herd every year.

Selecting replacement heifers is a tough job at the best of times, we use R.O.P. here, keeping in mind our future goal, birth weights of 100 lbs. or less with the highest possible average daily gain. By looking at the birth weights that are under 100 lbs. indexes that are over our average which is 100 and up, these heifers are kept for our herd replacements. We have found for us this system is best because if one only looks at the indexes you'll be breeding for high indexes but also high birth weights.

We've found those with high index and high birth weights, your heifer types very often are too masculine, have low fertility and more calving problems. The animals that fall into these catagories are put into the feedlot to be sold for slaughter.

Some of the important features for cow replacements are eye-appeal, good feet and legs, femininity and structural soundness, even then only half of the 20 replacement heifers, remain in our herd after first and second calving.

When selecting bulls, we choose to keep those who are born unassisted or an easy pull, out of a heifer. Their birth weight must be 100 lbs or less, they must gain 3 lbs per day of age for 365 days.

Eye appeal becomes important here, too, eyes must be set well apart and well down on the face, good legs and feet are very important, smooth but well muscled and easy fleshing, and docile.

Besides our livestock and grain farming, I've managed to find the time to be a 4-H leader for 12 years with our Heifer Club, I've been reeve of our Municipal Council for 10 years, I'm on the Board of Local Directors for the P.F.R.A. pasture and I served on a grassland project as president of our area from 1974-78. I'm also president of the local Agricultural Society and I love to sing with the barbershoppers, and ride horseback when time permits. In 1978 I received the Don Wood Memorial Award for community service. (My wife has recently offered to nominate me for a "stay at home" husband award, when she feels I'll qualify!

BY: Ron Batho, Oak Lake

PERFORMANCE - Before going this far we must make a decision as to what we expect from our cow herd. The type of cows we have, pasture, feed resources available for winter maintenance, whether we intend to market our production as calves, feeders or as finished beef. Once we have done this and positively identified each cow and calf in our herd we can, with the use of some type of performance records help achieve whatever goals we have set for our cow herd production. Performance records complete with birth weights, weaning weights, 365 day weights and if you choose 18 month weights;can be a valuable tool in making decisions as to whether you should be marketing your production as calves, feeders or finished beef. Performance records will not change our type of cattle but it will give us a record of an individuals production. We can then make the decision whether she has a place in your herd or whether she should be culled.

Performance records can give us a more complete handle on milking ability, cow fertility and bull fertility. Cattle type should not stray very far from that which can make economical use of available feed resources on the home farm. R.O.P. records can assist in making these decisions. Within a given frame size, faster gaining cattle are generally more efficient. Gains from weaning to yearling will give us this information. Milking ability is best determined by weaned weights. Cow fertility and reproduction effects the profit potential of a cow herd more than any other trait. What better way to determine this than by using our performance records.

R.O.P. production records will be of value to you if you intend to use them. R.O.P. records will require some of yours or someone elses time in your family to do. They also require the time of some people employed by livestock branches in our governments. If you intend to let them collect dust in some drawer, do yourself a favor and don't go on R.O.P. and also save yourself some tax dollars by not wasting government dollars or breed association time and money. If you use them, they can add some spice and excitement to your livestock operation. Increasing production with the use of R.O.P. can result in a more efficient and profitable beef cattle program. Let your cow herd work for you instead of you for it.